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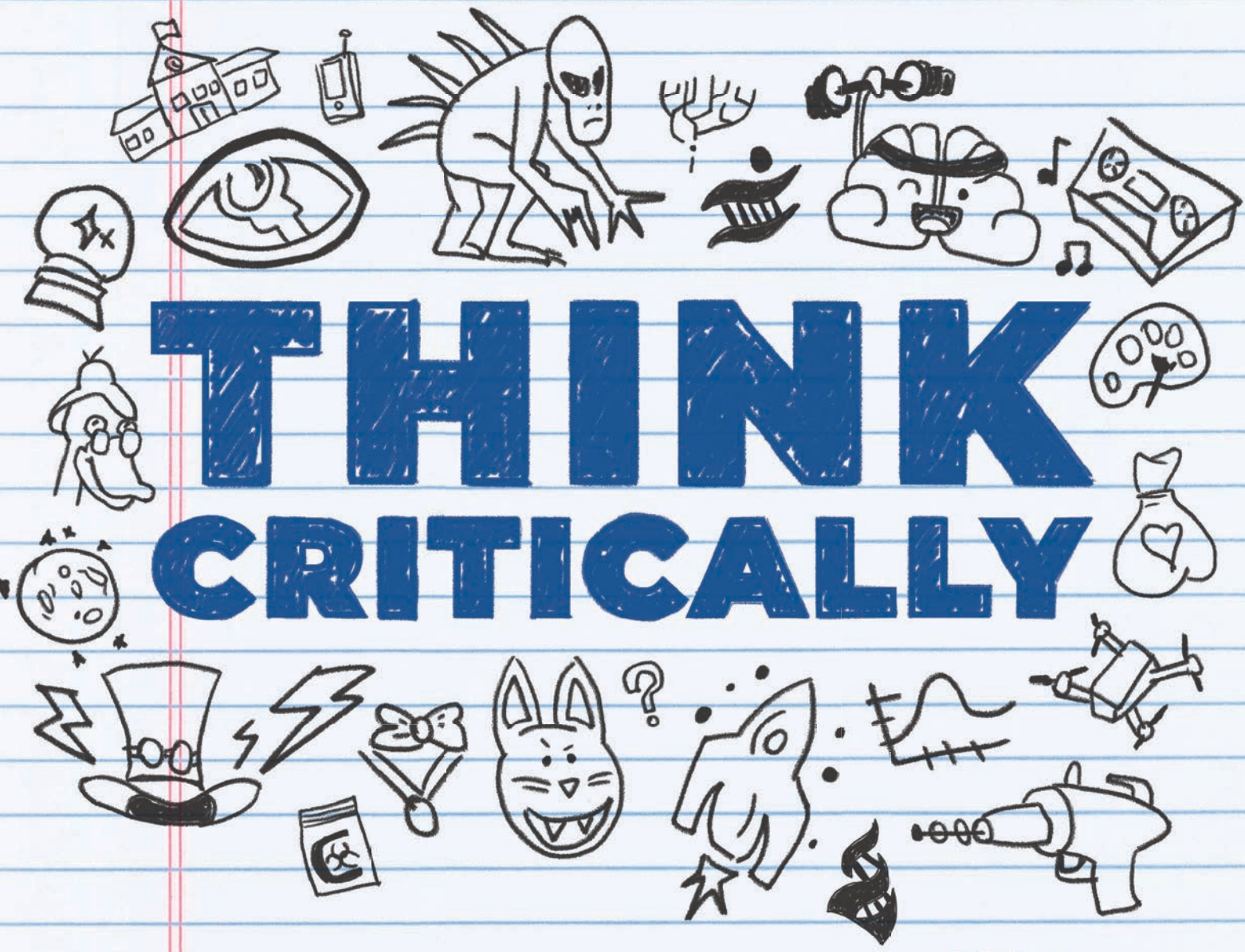

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[FROM THE EDITOR

Critical Thinking for Curious Minds

In this issue of Skeptical Inquirer, we have a thought-provoking special section on critical thinking in education. Our expert contributors include Stephanie Simoes, Steve Trash, Timothy J. Redmond, William Matthew London, Bertha Vazquez, and Melanie Trecek-King. David McRaney introduces each of these contributors in more detail, so I'll spend some time here introducing him, discussing my experience teaching critical thinking, and giving you some fun homework.

Science journalist and author of the international bestselling book *You Are Not So Smart*, McRaney also hosts a podcast by the same title for curious minds just like yours. His most recent book, *How Minds Change*, helps us examine our own beliefs, the beliefs of others, and the science of persuasion. His writings often include reflections from his own path toward thinking more critically.

Critical thinking in education has long been a priority for me as evidenced by a university course I developed called Exploring Strange Things: ESP, UFOs, Bigfoot, and More. I'm also lucky to have a small number of undergraduate students interested in helping our team edit this magazine. Look over on the right side of this page in the credits section, and you'll see a few of these students listed as beta readers; they routinely find mistakes that I miss, and a few have even published letters to the editor.

And now for the homework: First, send me a letter to the editor at letters@skepticalinquirer.org. You can let me know about an article you loved, or you can provide some constructive feedback. If you're a teacher, you can also encourage your students to send in letters. Writing a letter to the editor can be an effective activity for practicing critical thinking. Many of our articles are freely available at skepticalinquirer.org. Second, if you really want to have some fun, you can take a photo while holding *this* issue in front of something that you believe warrants more critical thinking. The example on this page is from a student on my team (and her son). Tag us on social media, and we just may print some of our favorites in a future issue.

—Stephen Hupp

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Joe Nickell Leaves a Legacy of Intrigue and Solved Mysteries

STEPHEN HUPP

Soon after his death on March 4, 2025, at the age of eighty, tributes to Joe Nickell started rolling in, and they will appear in the next issue of Skeptical Inquirer. Just days before the current issue went to press, I wanted to acknowledge the loss of our longest-tenured columnist and CSI's only senior research fellow.

Joe wrote his first article for SI in 1983 about the Nazca drawings, also called "riddles in the sand." His author bio for that article read: "Joe Nickell teaches technical writing at the University of Kentucky. A former professional stage magician and private investigator, he is best known for his research on the Turin 'shroud' and is author of *Verdict on the Shroud*, published by Prometheus Books earlier this year." This author bio of his stands out to me because these are all aspects of his life that he brought up with me during a memorable lunch together last year (the lunch ended with me getting his autograph). He seemed particularly proud to have been Paul Kurtz's go-to guy for the mystery of the shroud and for the many mysteries that followed.

Two years later, in 1985, his next article detailed an investigation into the reportedly miraculous appearance of the Virgin Mary's image on a cloak. Joe's author bio for that article added: "Much of his undergraduate work was in art—including advanced painting and art history." The bio also described him as "an expert in microchemical and instrumental analysis, including recent experimentation with laser-induced infrared fluorescence and other techniques in the examination of paintings."

And so, the documentation of his growing list of "personas" (as he called them) continued in his author bios for his articles every few years:

- In 1987, he wrote about spontaneous human combustion, and his bio said he "has written investigative articles for many magazines and journals."
- In 1989, he wrote about the shroud of Turin, and his bio for the first time described him as a fellow for CSICOP. The bio also added that he was the "author of *Inquest on the Shroud of Turin* (1983; 1987) and (with John F. Fischer) *Secrets of the Supernatural* (1988)."
- In 1992, he wrote about crop circles, and by then he had become "author of many books."
- In 1994, he wrote about miracles in two separate issues of SI, with his bio appropriately highlighting his newest book, *Looking for a Miracle.*
- In 1995, he wrote about crop circles again; this time his name made it onto the cover, and the phrase "investigator of strange phenomena" made it into his bio.

Joe wrote for SI a second time for the last issue of 1995, and this time he did so as an official columnist. Writing

about the alien autopsy hoax, the column itself bore the title "Investigative Files," a column title that remained to this day—three decades later. For the first time, his bio from that issue described Joe as CSICOP's senior research fellow, adding, "This is his inaugural Investigative Files issue."

As of this writing, when I search "Joe Nickell" at skepticalinquirer.org, the results show that he has 354 contributions, far more than anyone else (his column in this issue will make it 355). Not all those contributions were for the print magazine, but a staggeringly large number of them were indeed mailed out to subscribers. As you might have hoped, the author bios continued to reflect his growing list of personas. In fact, over the past several months, I started noticing the changes and admiringly chuckled each time his author bio highlighted some aspect from his legacy of intrigue. For example, here's a look back at his column topics and bios over the past five issues:

- In July/August (2024), he wrote about the vanishing of D.B. Cooper with this bio: "Joe Nickell, PhD, has been several kinds of investigator (private, literary, paranormal, etc.). In addition, he has also been a homicide consultant (to police and individuals). He is still active after half a century (and some fifty books)—now specializing in significant unsolved mysteries of various kinds."
- In September/October (2024), he wrote about the vanishing lighthouse keepers with this bio: "Joe Nickell, PhD, used his background as a magician and Pinkerton detective to investigate all manner of paranormal claims, including haunted lighthouses. He and his late wife Diana Harris twice served as 'assistant lighthouse keepers'—which he says helped him prepare for studying the lighthouse central to this case."
- In November/December (2024), he wrote about an imposter pretending to be the Grand Duchess Anastasia with this bio: "Joe Nickell, PhD, has spent more than half a century probing historical, forensic, and paranormal enigmas."
- In January/February (2025), prompted by my request, he wrote a big picture piece for our special 250th issue that more broadly focused on his favorite investigative strategies. He used this bio: "Joe Nickell, PhD, has made a career in various roles solving mysteries. Solving illusory matters, he became a magician (Resident Magician at the Houdini Hall of Fame) and Hollywood Stunt trainee (performing in the stunt show at the Santa Monica Main Street Fair). Licensed as a PI by the Ontario Provencial Police, he became a Pinkerton detective. Then he became an armed special officer, a homicide consultant, and a recipient of a doctorate in English (with dissertation on Literary Investigation). Subsequently, he has also published numerous books, including *Crime Science* and *Detecting Forgery*."
- In March/April (2025), he wrote about the film *The Devil on Trial* with this bio: "Joe Nickell, PhD, is CSI's senior research fellow. A former stage magician and private detective, he has—since 1969—investigated numerous cases of alleged ghosts, poltergeists, and demons from a scientific perspective."

One day soon, I'll go back to the beginning and read each of those evolving bios across 355 articles that together represent each of the 1,066 personas that he—famously—lists on his website, joenickell.com. Some personas really caught my eye: detectivologist, fakelorist, friggatriskaidekaphobiologist, jokelorist, monsterologist, ufologist, and vampirologist.

Other personas made my eyes pop: barroom brawler, bear-catcher's sidekick, carousel operator, cartoon character, gold prospector, magic kit creator, riverboat manager, secret agent, undercover operative, and "zombie."

Lastly, some personas show another side of Joe, a side that often surfaced when we chatted: civil rights worker, conservationist, community organizer, demonstrator, federal fugitive, refugee, philosopher, humanist, and family man.

I'm thankful to have had this time working with Joe. His columns and books have been delighting me for years, and I feel fortunate that we can continue exploring mysteries through his eyes thanks to his large catalog of published articles and books.

Stay tuned for the next issue of SI, where we'll be sharing many other tributes. Lastly, I want to say thanks to Joe for bringing intrigue into my life on a bimonthly basis through his hand-on investigations and solved mysteries. ■

Stephen Hupp is the editor of Skeptical Inquirer and a Nickellologist.

News Bites: From Earhart Plane Pareidolia to Mass Firings at Science Agencies

Stephen Hupp and Benjamin Radford

Image of "Amelia Earhart's Plane" Turns Out to Be Rocks. On November 1, 2024, an ocean exploration company, Deep Sea Vision, explored the site previously identified as potentially having a plane with a similar shape to the one Amelia Earhart was flying when she disappeared. The sonar image, however, turned out to elicit pareidolia from a natural rock formation. (For more, read "They Thought They'd Found Amelia Earhart's Plane. Instead, the Search Continues" at cnn.com.)

Dr. Joe Schwarcz Appointed to the Order of Canada. On December 18, 2024, CSI Fellow Joe Schwarcz was appointed to the Order of Canada. A statement from the Order of Canada says, "Joe Schwarcz demystifies the public's understanding of science. Founding director of the renowned McGill University Office for Science and Society, he is internationally celebrated as a master science communicator. He hosts the longest-running radio show on chemistry, writes a weekly column and has authored best-selling books, educating people about true, evidence-based science and promoting critical thinking." (For more, read "Appointments to the Order of Canada – December 18, 2024" at gg.ca/en/appointments-order-canada-december-2024.)

Bigfoot Search Kills Two. On December 25, 2024, two Oregon men were reported missing after failing to return from a search for Bigfoot in Gifford Pinchot National Forest, a heavily wooded region known for Bigfoot reports. The men, aged thirty-seven and fifty-nine, were poorly equipped and died of exposure amid snow, rain, and freezing temperatures. The sheriff's office located the missing men's vehicle using one of many Flock cameras installed in the area and passed that information along to a search and rescue coordinator. Over sixty search and rescue personnel scoured the region, joined by canine units on the ground. They were supported from the air by drone teams and a Coast Guard helicopter equipped with infrared cameras to detect heat signatures. Three days after being reported missing, the men were found dead. (For more, read "Men Searching for Sasquatch Found Dead: What We Know" at newsweek.com.)

Facebook Ends Fact-Checking. On January 7, 2025, Facebook announced that they would stop using third-party fact-checking programs to allow more free speech. In a video message, Mark Zuckerberg indicated that the fact-checking program was too politically biased and made too many mistakes, adding that "the recent elections also feel like a cultural tipping point toward once again prioritizing speech." Using X (formerly Twitter) as a model, Facebook will instead use a Community Notes system. Further, they are moving their Trust and Safety and Content Moderation teams from California to Texas. Zuckerberg indicated that Texas is preferable by saying, "I think that it will help us build trust to do this work in places where there is less concern about the bias of our teams." (For more, read "More Speech and Fewer Mistakes" at about.fb.com.)

New Animal: Crustacean Named after Darth Vader. On January 14, 2025, the journal *ZooKeys* published the scientific identification of a fourteen-legged crustacean, *Bathynomus vaderi*, named after Darth Vader. New to science, this creature has been a local seafood delicacy in Vietnam for several years. Living in the ocean's darkest depths, this "supergiant" crustacean has a face that (loosely) resembles its namesake. (For more, read "Researchers Identified a New 'Supergiant' Crustacean With 14 Legs—and They Named It After Darth Vader" at smithsonianmag.com.)

Mass Firings at Science and Health Agencies. On February 14, 2025, a memo from the National Institutes of Health shared the plan to cut over 5,000 employees. The Centers for Disease Control and Prevention and the Food and Drug Administration also announced mass firings. These agencies, all under the Department of Health and Human Services, were guided by the new Department of Government Efficiency to cut back on staff to save money. Days later, the National Science Foundation, an independent government agency, also announced the plan to dismiss about 10 percent of employees. The long-term fallout of these mass firings is yet to be determined, but the short-term consequences for the affected scientists are potentially devasting. (For more, read "Mass Firings Decimate U.S. Science Agencies" at science.org.) ■

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MacEwan University
Edmonton, Alberta, Canada

Bill Nye Awarded the Presidential Medal of Freedom

Stephen Hupp

Getty Images

On January 4, 2025, then-President Joe Biden awarded Bill Nye the presidential medal of freedom at a ceremony in the White House as an announcer made this statement:

> The presidential medal of freedom is awarded to William Sanford Nye. A Washington, DC, native, Bill Nye began his career as a cutting-edge mechanical engineer in Seattle before becoming a beloved science educator for the nation. Earning nineteen Emmy awards for his energetic experiments on television as Bill Nye the Science Guy, he also earned the trust of millions of children and families. By sharing the magic of fun and science, he inspires generations of Americans to follow facts and reason and leave the world better than we found it.

Nye, a CSI fellow and recent guest editor for Skeptical Inquirer, frequently credits his parents, Edwin Darby "Ned" Nye and Jacqueline Jenkins-Nye, for his success as well as for all they did for America as veterans of World War II. In his book, *Everything All at Once*, he writes:

> My father survived nearly four years as a prisoner of war captured from Wake Island. My mother was recruited by the U.S. Navy to work deciphering the Nazi Enigma code. They were part of what came to be known as the Greatest Generation, but they didn't set out to be great. They just played the hand they were dealt. In barely five years, their generation resolved a global conflict and started building a new, democratic, technologically advancing world. With an emphatic sense of purpose, they embraced progress. (p. 353)

Nye added, "The current generation must employ critical thinking and our powers of reason just as they did."

Congratulations, Bill Nye, and thank you for all that you and your parents have done for our country! ■

Stephen Hupp is the editor of Skeptical Inquirer.

California Wildfires Trigger Conspiracies and Unfounded DEI Scapegoating

Benjamin Radford

The fires that devastated Los Angeles in January 2025 burned over 18,000 structures, killed dozens of people, and forced the evacuation of about 200,000 people. The chaos—as well as the economic and environmental devastation—was made worse by a flurry of misinformation, rumors, and conspiracy theories.

Conspiracies circulate in the wake of almost every high-profile accident or incident. When a container ship lost power and struck Baltimore's Francis Scott Key Bridge in March 2024, rumors and conspiracies—suggesting that it was all part of some hidden agenda or a "planned distraction" from unspecified issues—began to circulate within hours. In the world of conspiracies, as the saying goes, "there are no accidents." Even hurricanes, wildfires, tsunamis, and other obviously natural disasters are suspected of being part of a dark conspiracy.

Gail deVos, a Canadian folklore researcher, has catalogued how the wildfires that ravaged parts of Canada in recent years were claimed to be part of a conspiracy. Rumors circulated by conservative Canadians claimed that the wildfires had nothing to do with global warming—which, of course, they consider a hoax—but instead were sparked by liberal arsonists or the left-leaning Trudeau administration.

Perhaps the most common conspiracies revolved around how the Los Angeles fires started. The idea that such an extraordinary event might have a mundane explanation didn't sit well with many. The same thinking appeared following the death of Diana, Princess of Wales: How could a fabulously wealthy, popular, and glamourous woman—a member of the British royal family, no less—have been killed in a late-night drunk driving accident in a Paris tunnel? No, it must have been a cleverly disguised assassination by the British intelligence agencies (or those upset at her romance with an Arab man, etc.).

Mystery-mongering videos claimed that directed energy weapons—perhaps including the dreaded Jewish Space Lasers—ignited the flames, which Rep. Marjorie Taylor Greene of Georgia claimed had started previous California fires. Others focused the standard "follow the money" conspiracy trope; if you assume—despite evidence to the contrary—that the fires were started intentionally, why? One rumor surfacing in Los Angeles (and in locations of other fires, including Hawaii and British Columbia) is that it's all a ruse for unspecified authorities to claim ownership of valuable land to establish so-called "smart" or "fifteen-minute" cities. These are eco-sustainable cities designed to make daily needs accessible within a fifteen-minute walk or bike ride. This seemingly sinister plan, endorsed by the United Nations and other organizations, is intended to reduce public dependency on gas-fueled vehicles.

Of course, there are multiple logical flaws in that particular conspiracy, not the least of which is that losing a home in a fire has no bearing on land ownership; just because a structure on a property burns down or is destroyed in a flood, hurricane, or other natural disaster, it doesn't mean that the federal government owns it. Homeowners may or may not choose to rebuild, but that's a separate issue.

Some on social media claimed the fires were intended to destroy incriminating evidence in the ongoing sex trafficking case against Sean "Diddy" Combs, whose mansion "conveniently" burned to the ground—except that the FBI had already searched the residence, and in any event the fires never reached his estate. In fact, investigators looking at security camera footage triangulated the ignition source and concluded that at least one of the fires started at the base of a power line.

President Donald Trump falsely blamed Governor Gavin Newsom for not making sufficient water available for firefighters, when in fact the hydrant system was not designed for such a widespread conflagration. Other Republicans, including former Fox News host Megyn Kelly, attributed the disaster to their most recent Boogeyman, DEI (diversity, equity, and inclusion) initiatives. Noting that L.A. Mayor Karen Bass is a Black woman and that the city's fire chief Kristin Crowley is a lesbian, some posted on social media that DEI was prioritized over people's lives. However, no evidence was provided demonstrating that DEI practices had led to the hiring of any incompetent leaders or firefighters—much less ones involved in the fires—or that Crowley, a twenty-two-year veteran of the fire department, had done anything wrong.

In the world of conspiracies, one wild theory is as good as the next and serves various purposes, including hampering recovery and scoring cheap political points. Those spreading misinformation are in the business of raising questions, not providing answers—even for their own claims. ■

Benjamin Radford is deputy editor of Skeptical Inquirer.

Witchcraft Accusations Spur Arrests, Killings

Benjamin Radford

United Nations - Flickr

In early December 2024, nearly 200 people—most of them elderly—were killed in Haiti after being accused of using black magic. The attack occurred in Cité Soleil, a slum in the capital of Port-au-Prince. The country is run by rival gangs who attack police, hospitals, civilians, and each other with impunity. One of the most powerful gang leaders, Monel Felix, ordered the slaughter after being told that his son's sudden illness had been caused by a voodoo curse. In response, he and his gang members went shack to shack attacking with knives and machetes people suspected of practicing voodoo. In some homes, entire families were killed, their mutilated bodies dragged into the streets and set afire. Several bystanders and motorcycle taxi drivers who tried to help the victims were also killed on the spot.

Haiti's acting prime minister, Alix Didier Fils-Aimé, condemned the incident and described it as "a monstrous crime that constitutes a direct attack on humanity and the republican order," promising to spare no effort in bringing the killers to justice, though few consider the goal realistic. Haiti has been wracked by violence and lawlessness for years, especially following the 2021 assassination of its president. Most countries are reluctant to send peacekeepers into the quagmire, though a small force of mostly Kenyan troops arrived several months ago. Aid workers have been targeted, and airplanes carrying badly needed supplies cannot land because the airport was closed after planes were struck by gunfire. This is not the first time that Felix has targeted voodoo practitioners for execution; in 2021, he is believed to have ordered the killing of a dozen women, according to The National Human Rights Defense Network.

A few weeks later, in the African country of Zambia, two men were arrested on suspicion of trying to curse the president, Hakainde Hichilema. Mozambican Jasten Mabulesse Candunde and Zambian Leonard Phiri are claimed to be witch doctors hired to magically harm the president by a relative of a political rival, Emmanuel Banda, an ally of the former president Edgar Lungu. Banda was accused of robbery and fled Zambia as a fugitive and was later arrested in neighboring Zimbabwe. The pair were allegedly promised two million kwacha (about $72,000 USD) for successfully casting a curse on the president, though police did not specify what evidence they had. Police in the capital of Lusaka issued a statement that "The suspects were found in possession of assorted charms, including a live chameleon, and are alleged to be practicing witchdoctors. Their purported mission was to use charms to harm the head of state, his excellency President Hakainde Hichilema."

Leo Igwe, founder of Advocacy for Alleged Witches, issued a statement condemning the arrests. It read in part:

> This incident highlights the enduring potency of witchcraft fears and the unsettling connection between occult anxieties and national politics. Suspicion of witchcraft or possession of charms should be the least of Zambia's concerns at this critical time. Such beliefs have no place in modern politics, as there is no evidence to substantiate them. Zambian law does not recognize witchcraft, and the Witchcraft Act specifically criminalizes accusing others of practicing it. By naming and imputing witchcraft in this case, the police themselves appear to be violating the law. How did the police determine that the accused were "witchdoctors"? Did the men identify themselves as such? What, precisely, constitutes a "charm"? Is a chameleon inherently a charm? How did its possession translate into evidence of witchcraft? Without clear answers, the police's case lacks credibility.

As of this writing, the charges have yet to be resolved. Accusations of witchcraft resulting in attacks, maiming, or death are not uncommon, especially in sub-Saharan Africa, Pakistan, and South America. This tragedy is a reminder that whether or not magic exists, the belief that it does can have deadly consequences. ■

Benjamin Radford is deputy editor of Skeptical Inquirer.

CFI Statement on the Senate's Vote to Confirm Robert F. Kennedy Jr. as Secretary of Health and Human Services

Editor's note: The Center for Inquiry issued the following statement on February 13, 2025.

As a nonprofit organization dedicated to promoting evidence-based science and debunking health and wellness misinformation in all its forms, the Center for Inquiry (CFI) is deeply disappointed that the United States Senate voted to confirm Robert F. Kennedy Jr.'s nomination to lead the Department of Health and Human Services by a vote of fifty-two to forty-eight.

CFI President and CEO Robyn E. Blumner warns Kennedy's confirmation has the potential to undo years—or even decades—of important public health science. "It has been said that it takes an engineer to build a bridge, but any a-hole can blow it up," Blumner said. "The same is true for public health. Expertise and painstaking, methodical medical science results in effective treatments and good public health, whereas purveyors of quack medicine and anti-vaccine conspiracies, such as Robert F. Kennedy Jr., can undo it all in the blink of an eye."

The Center for Inquiry publicly opposed Kennedy's nomination from the outset, calling it "the worst possible choice the incoming president could make for the vital job of protecting public health" ("The Worst Possible Choice" 2024). CFI's Quackwatch created a special "RFK Jr. Watch" resource page (https://quackwatch.org/rfk-jr-watch/) to highlight Kennedy's long history of anti-vaccine fearmongering and promoting misinformation and to amplify the widespread resistance to his nomination from scientists, doctors, and public health professionals.

Quackwatch's William Matthew London, EdD, MPH, said Kennedy's confirmation points to a grim future for public health in the United States: "I'm afraid that a vaccine science denialist like Kennedy as the nation's highest health official will result in greatly increased morbidity and mortality due to preventable infectious diseases, much the way denial of the science of plant genetics in Stalin's USSR under Trofim Lysenko's command of Soviet biology and agronomy contributed greatly to widespread famine."

Azhar Majeed, CFI's director of government affairs, said, "In confirming Kennedy, the Senate has overlooked decades of evidence about his anti-vaccine views, belief in conspiracy theories, and active spreading of misinformation."

Majeed promised, however, that Kennedy's confirmation would not in any way diminish CFI's continuing efforts to promote scientifically sound public health policy. "CFI's Office of Public Policy will work to minimize the damage that comes out of his new post. In particular, we will continue to lobby aggressively to make sure that the FDA, CDC, and NIH serve their missions to protect American public health." ■

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'The worst possible choice': Center for Inquiry blasts selection of RFK, Jr. to head health and human services. 2024. Center for Inquiry (November 15). Online at https://centerforinquiry.org/news/the-worst-possible-choice-center-for-inquiry-blasts-selection-of-rfk-jr/.

Scan Code Below to Watch:
Countering the Next Phase of American Anti-Vaccine Activism | Peter Hotez
A Conversation with Paul Offit: What RFK Jr.'s Confirmation Could Mean for the American Health Care System
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[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell, PhD, was called "the Modern Sherlock Holmes" (by philosopher Paul Kurtz), "The Detective of the Impossible" (by Italian skeptic and mystery novelist Massimo Polidoro), and "the Master Solver of Major Popular Mysteries" (by former SKEPTICAL INQUIRER Editor Kendrick Frazier).

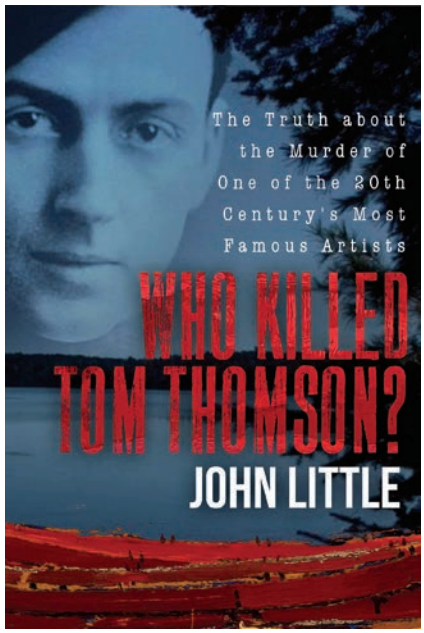
Mystery of an Artist's Two Graves: Was Tom Thomson Murdered?

Editor's note: SKEPTICAL INQUIRER was fortunate to have Joe Nickell as a columnist for thirty years, and we are thankful to have had over 350 contributions sharing his insights. Page 5 includes an "In Memoriam" reflection about Joe, and many more tributes are forthcoming in the next issue. The following column was submitted and accepted prior to his death.

Tom Thomson (1877–1917) typically spent winters in Toronto, Ontario, Canada, but from spring until late fall lived in Algonquin Park, where he was a skilled outdoorsman, guide for hire, and—most notably—an artist. He is now sometimes thought of as a Canadian van Gogh. His paintings of Northern Ontario's lakes and landscapes inspired the formation of the school of art known as the Group of Seven (Saunders 1947, 163–175; Murray 1998, 78, 89–93). I was fortunate to have passed through the area in the early 1970s and learned of Thomson's work, even getting to visit his old shack (Addison with Harwood 1969, 49). And then I learned of his controversial death.

Mystery upon Mystery

Intending to go trout fishing on the morning of July 8, 1917, on adjacent Gill Lake, Thomson had set off in his favorite gray canoe in what was appropriately named Canoe Lake. When he failed to return, a search was instituted and—eight days later on July 16, 1917—he was found floating in the shallows at the northern tip of Canoe Lake. Because of a delay in getting instructions from Thomson's family—and



due to serious decomposition of the corpse—his remains were infused with embalming fluid, placed in a casket, and interred temporarily in a tiny cemetery overlooking the lake, the Mowat Cemetery.

The coroner arrived on July 17, and an inquest was held that night. The next day, the family's undertaker exhumed the body and transferred it to a metal casket, which was soldered shut. It went out by train the following day and was interred in the family's plot in United Church Cemetery at Leith, Ontario.

Over the years, however, gossip flourished and rumors multiplied, creating *different versions* of nearly every aspect of the Thomson story. Had the corpse really been transferred? How had Thomson really died? In 1956, some good ol' boys, having had a few drinks, decided to get shovels and make their own inquiry. They dug at the first grave and discovered not an empty grave but one with a skeleton and coffin, giving rise to new stories. John Little asks in his 2018 book: *Who Killed Tom Thomson?*

Now, the different versions of portions of the Thomson saga are what folklorists call *variants*, and they are evidence of the folklore process at work. As this is a magazine column and not a lengthy book—certainly not the armload of books now available on the case—we will necessarily cast back to early sources, following the precept of Occam's razor, which holds that explanations requiring the fewest assumptions are most likely correct. And we will seek out corroborative evidence regarding major points to buttress our findings. Thus, we will attempt to solve the now complex, and very muddled, mystery—or rather mysteries: How many corpses are in Tom Thomson's two graves? And how many murders, if any, must be solved? We are looking for a straightforward, factual story.

Thomson's Body

After Thomson's body was found decomposing in the lake, fishing line was noted as being wrapped numerous times around his left ankle. Much was made about it being *his* line or, to the contrary, *not* being his (Colombo 1988, 121; Little 2018, 28). In fact, it appears that the line was simply that which had been used by the discoverers of his floating body to tow it to shore and to keep it secured, "tethered to the limb of a tree," until it was attended to (Little 2018,

Tom Thomson's painting *The Canoe* (1912) in the Art Gallery of Toronto.

21). It was also claimed that Thomson's canoe "was never recovered" (Colombo 1988, 121). As it happened, however, the canoe had been found "abandoned" and "overturned" the day after Thomson had left on his outing, and it was taken to a site for safekeeping (Little 2018, xxix).

Again, sources differ on a single marking found on Thomson's head, described exaggeratedly as a "gash" on the "right forehead" (Colombo 1988, 121) or more accurately as "a bruise on right temple" about four inches long (in a doctor's affidavit, quoted in Little 2018, 26).

At this point, there is a simple hypothesis for Thomson's fate—one that happens to even seasoned outdoorsmen from time to time (as indeed it did to one of my family members, causing his drowning in 2022). It only affects men who decide to stand up in a boat to urinate over the side. This is risky enough in a flat boat, but it is especially so in a canoe. Such an act could cause the man to lose his balance and fall, hitting his head on the upper edge of the canoe in the process. This possibility has much to recommend it. It is a simple, common accident that could account for all the known evidence: a long bruise mark on the right side of Thomson's head, his consequent drowning, and the overturned canoe—corroborative evidence indeed.

At the inquest into Thomson's untimely death, Dr. Goldwyn Howland had given his opinion that Thomson's death was caused by his head having struck some obstacle, such as falling on a rock, which resulted in the cause of death, "drowning." In addition to the four-inch bruise on the right temple, Howland also noted "some bleeding from right ear." This medical opinion from a physician who actually examined Thomson's corpse appears decisive, notwithstanding much subsequent mystery mongering. The death certificate cited the cause of Thomson's demise as "accidental death by drowning" (Little 2018, 24–25, 43–47).

Because Thomson's body had been temporarily interred before the inquest, it now remained for it to be sent home to the artist's family. The family's hired undertaker arrived to exhume the body from its oak casket (and outer rough box), transfer the body to a metal casket bought by the family, and solder that casket shut. This all took a few hours, but later gossip by locals decided that was not long enough. There began to be speculative tales to the effect that the body had remained in the grave while rocks were unaccountably substituted into the coffin taken by train to its final resting place!

When the coffin ostensibly containing Thomson's body arrived in Owen Sound by train, it was kept in the undertaker's establishment overnight. The next day (Saturday, July 21), it was interred in its final resting place in the United Church Cemetery in Leith,

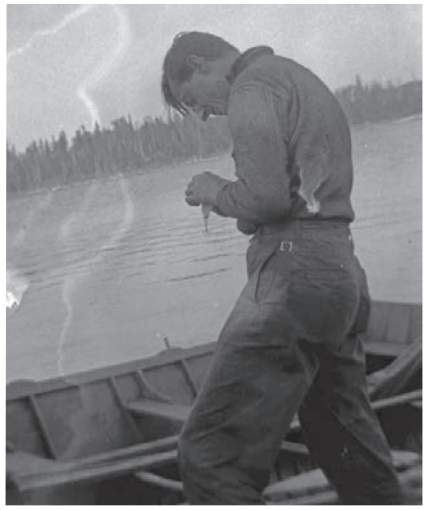
Ontario. (There is a family story that the coffin was opened the previous day so family members could establish identity [Colombo 1988, 121], but this sounds like retroactive invention years later—after controversy developed as to where Thomson was buried. It appears incompatible with evidence to the contrary [Little 2018, 124, 296–297]. Besides, recall that the coffin had been soldered shut.)

Digging Up Confusion

Over the next thirty-nine years, the Thomson saga simmered, much of it stirred by an aging Algonquin Park ranger and raconteur named Mark Robinson. Until he died in 1955, Robinson convinced many that Thomson's body never left the first grave. Then, in 1956, William Little (who would go on to write a book on Thomson [Little 1970] and inspire his son to write another [Little 2018]) became involved. The senior Little and three friends (reportedly fortified with "a few drinks" [MacGregor 2010]) made their way one October day to the tiny Mowat Cemetery armed with three shovels and an ax.

The picturesque cemetery is one where Thomson had sometimes come to paint, taking advantage of the view it afforded. The men had trouble locating the old grave, but they finally adjusted their estimation and dug at a depression by a small balsam tree, taking turns. Finally, they encountered polished wood and a tibia (shin bone). They next brought back a medical director named Dr. Harry Ebbs, and he involved members of the Ontario Provincial Police crime laboratory.

Soon they turned up a skull with high cheekbones and a very round hole three quarters of an inch across in the *left* temple. The lab's director, Dr. Noble Sharpe, did not think this was caused by either a blunt instrument or a bullet. There was no exit for such, and the hole's lack of beveled edges further helped rule out the "gunshot theory." The hole could not in any way be associated with Thomson, the linear mark on his head *having been on the opposite side*. However, this did not keep those wishing the skull to be Thomson's from



Thomson fishing in Algonquin Park, c. 1914–1916. Many of his works were painted in the area.

believing it was.

Indeed, the mystifiers not only equated the skeleton with Thomson, but they continued to speculate on what they imagined to be his "murder." They suspected the husband of a woman Thomson supposedly had an affair with—the husband and Thomson having supposedly argued (Colombo 1988, 121). Other suspects were also available, including a man Thomson allegedly had a recent "fight" with (Little 2018, xxix).

However, authorities eventually determined the hole in the skull was probably due to *trephining*, an operation to remove a disc of bone for surgical purposes. Moreover, the bones were determined not to be those of Thomson but rather proved to be from "an Indigenous person" of between "twenty to thirty years"—as opposed to Thomson's age of forty years. With the bones were found remains of Thomson's oak casket and rough encasing box, which the undertaker had left in the empty grave after transferring Thomson's body to the metal casket and taking it by train to Leith (Little 2018, 263–277).

The findings ought to have settled the matter, indicating that a local, perhaps impoverished, Indigenous person had simply been buried in an abandoned grave by someone taking advantage of it already having been dug and apparently also making use of the oak casket that had been left behind. But those who were determined to put Thomson back in his old grave responded with an abundance of *would've*s, *should've*s, and *could've*s, trying to make the Indigenous person's skeleton fit Thomson.

Spectre

Despite the evidence, Judge William T. Little insisted in his book *The Tom Thomson Mystery* (1970, 123), that "The mystery attending Tom Thomson's death and subsequent burial will never be solved short of an official opening of the Thomson family plot at the United Church Cemetery at Leith." I think that is clearly not necessary. As to who is in Tom Thomson's grave, it is Tom Thomson himself.

Meanwhile, there are those whose vivid imaginations permit them to encounter Thomson's recurring ghost. As John Robert Colombo (1988, 121) wrote in his *Mysterious Canada*: "Since that fatal day in 1917, numerous guides, fishermen, campers, and tourists have described the misty shapes they have seen moving across the waters of Canoe Lake. They report the progress of a lone, lean paddler in a gray canoe."

Alas, when they look closer, there is never anyone there. Despite the old saying "seeing is believing," science has never authenticated a single ghost. Such apparitions are only mental images, dramas—not of another world but of this one (Nickell 2012, 30). ■

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[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

Massimo Polidoro is a writer, lecturer, investigator of the unusual, and cofounder of CICAP, the Italian skeptics group. His YouTube channel is at @Massimo_Polidoro.

Love, Money, and the Sacred: When the Irrational Is Rational

In the 1993 movie *Indecent Proposal*, a young couple finds themselves on the brink of financial ruin after losing their savings at a casino. Just when they believe there is no way out, an eccentric millionaire appears with a shocking offer: he will give them one million dollars if he can spend a single night with the wife. Although the proposition seems straightforward—one night in exchange for a lifetime free from debt—it evokes an instinctive sense of revulsion. Even the fact that this millionaire is played by the charming Robert Redford does not lessen the moral outrage such a deal inspires in most viewers. How can money ever justify a transaction that appears to compromise genuine love?

At first glance, some might argue that taking the offer is entirely logical. The couple's desperate financial situation would instantly be resolved, and the marriage could presumably continue uninterrupted afterward. The purely rational cost-benefit analysis suggests a net gain—especially if the alternative is homelessness or crushing debt. Yet, as so many of us innately feel, something about this transaction violates a core value we cannot easily reduce to a price tag. Love, trust, and fidelity resonate in a sphere beyond mere economics.

To explain why we instinctively balk at deals like this, psychologist Philip Tetlock introduced the concept of "sacred values," those that a community or society holds so dear that they cannot be legitimately compared to material or secular concerns, such as money (Tetlock et al. 1996, 25–51). When people view a certain principle or entity as sacred—be it romantic loyalty or the well-being of a child—they regard it as fundamentally outside the realm of negotiation.

Tetlock's research illustrates this through a series of experiments (Tetlock et al. 2000). In one scenario, participants learned of a hospital administrator forced to choose which of two gravely ill children would receive a life-saving treatment. This tragic compromise sparked sympathy among participants, who understood the gravity of making an impossible choice. However, in a second scenario, the choice was between saving a single child's life or saving the hospital $1 million. This time, participants were united in their disapproval of the option of "selling" a child's life for financial gain. The outrage was so strong that even taking time to *think* about the trade-off was deemed unacceptable. It was, in Tetlock's words, a "taboo trade-off."

These findings reflect our human tendency to protect certain values from the cold logic of the marketplace. As Professor Bruce Hood observes, we often regard human lives, sacred objects, and special places as beyond price. If society placed a monetary value on everything, from intimate relationships to life-or-death decisions, it would undermine the trust, empathy, and social cohesion that hold communities together. Once sacred values become commodities, the shared understanding that supports our collective moral framework weakens (Hood 2009).

But how does something become "sacred" in the first place? Hood suggests that part of the answer lies in our instinct to believe in deeper, hidden qualities. When we declare an object or idea sacred, we imbue it with uniqueness and irreplaceability. If it could be copied or substituted without loss, its aura of sanctity would vanish. This quality of sacredness often thrives on belief rather than empirical proof (Hood 2009). Philosopher Telmo Pievani points out that not every belief has to be supernatural. Citing Nelson Mandela's unwavering fight against apartheid—despite decades of imprisonment—Pievani calls it a form of "beautiful belief": a steadfast conviction that, although seemingly irrational, ultimately changes the course of history (Polidoro 2023, 190).

Returning to the dilemma in *Indecent Proposal*, it becomes clear why the offer feels unacceptable to many of us. Even when the alternative is bleak, the idea of "selling" intimacy strikes at the heart of a sacred value—love—thereby violating principles we hold dear. Reducing that intimacy to a business deal implies stripping it of its irreplaceable, transcendent quality. A purely financial solution, no matter how logical on paper, clashes with our deep-seated conviction that certain elements of the human experience must remain beyond trade.

In the end, it is precisely our "irrational" reverence for love, human life, and moral principles that preserves the social fabric. While reason and economic considerations play a crucial role in our daily decisions, they cannot account for all that we hold sacred. Some things, we instinctively know, are simply not for sale—and that collective recognition is vital for sustaining trust, meaning, and unity in the face of life's most difficult choices. ■

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[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

The Telepathy Tapes: A Dangerous Cornucopia of Pseudoscience

The New Year started badly. I woke on January 1 to discover that *The Telepathy Tapes* was the most popular podcast in the United States on both Spotify and Apple iTunes. The enormously popular *Joe Rogan Experience* had dropped to number two, and my first thought was, "My life's work has been for naught. The world is awash with pseudoscience, false belief, and superstition." I'd heard about this podcast from some of my colleagues who are concerned about the pseudoscience that plagues autism treatment, but I hadn't yet listened to it myself. So, doing my best to muster some hopefulness about the new year, I picked myself up off the floor and put in my earbuds.

In my assessment, there is good news and bad news here. The good news—if you can call it that—is that *The Telepathy Tapes* is a veritable cornucopia of pseudoscientific beliefs, some new and many old, all presented with breathless wonder and inspirational background music. A partial list of the beliefs given credence in the podcast include telepathy among people with and without profound autism, telepathic thought insertion, psychic viewing through blindfolds, a large community of nonspeaking people with autism who communicate regularly in a kind of telepathic chat room called "The Hill," psychic precognition, perception of other dimensions, perception of auras, communication among sleeping people via dreaming, communication with the spirits of the dead, Heaven (no mention of Hell), angels, demons, and God. What's more, according to a promo for the yet-to-be-released season two, future episodes will present additional "gifts" of nonspeaking people with autism, such as healing, remote viewing, and psychokinesis.

So, if you are the kind of person who is open to this panoply of paranormal and supernatural beliefs, *The Telepathy Tapes* podcast is for you, but I'm hopeful that many people will not go all the way down that road of credulity. In my opinion, the quality of "investigation" presented here is on par with your average cable television ghost hunter show. Unfortunately, *The Telepathy Tapes* has something else going for it that the typical paranormal investigation show does not: the voices of parents who are dealing with the substantial challenges of raising children with severe forms of autism and extremely limited language ability. It is hard not to feel sympathy for these parents, but it is also true that they are far

from objective observers.

The 'Experts'

If you do a Google search for "The Telepathy Tapes," you will find that the show is classified as a "science podcast." Nothing could be further from the truth. It is, in fact, an explicitly *anti-science* podcast. The most skeptical testimonial comes from the cinematographer on the show who is described as a "huge skeptic" and a "materialist," but by the end of episode one, like Mickey Dolenz, he was a believer. After witnessing a psychic popsicle stick–sorting demonstration that I will describe below, he is totally on board. So much for skepticism.

The "scientists" and "experts" on the show are all people with long histories of paranormal belief.

The primary expert of the podcast, who appears in several of the episodes, is Diane Hennacy Powell, a psychiatrist and author of the 2008 book *The ESP Enigma: The Scientific Case for Psychic Phenomena.* The biography on her website (https://drdianehennacy.com/) describes her as "author, public speaker, researcher and practicing psychiatrist" but does not include a *curriculum vitae* or list of publications. The biography frequently describes her as a researcher, but a Google Scholar search did not turn up any published empirical studies authored or coauthored by her. In addition to the book, she appears to have written three chapters in edited books and several book reviews in the *Journal of Parapsychology* and other places. Her biography also indicates that she "served as the Director of Research for the John E. Mack Institute (JEMI) after John, a former colleague at Harvard, passed in 2004." Many readers will recall that Harvard professor of psychiatry John Mack wrote the 1994 book *Abduction: Human Encounters with Aliens* and was a famous believer in alien abduction.

Jeff Tarrant is a psychologist who occasionally joins the podcast to record quantitative electroencephalography (qEEG) tests on purportedly psychic people. Although the EEG machine adds an air of science to the proceedings, nothing definitive can be learned about telepathy from looking at EEGs. Almost any pattern of brain waves can be rationalized to fit a preexisting belief, and the evidence suggests that Tarrant has such a preexisting belief. He is the author of the 2023 book *Becoming Psychic: Lessons from the Minds of Mediums, Healers, and Psychics*—which Diane Hennacy Powell reviewed in the *Journal of Anomalous Experience and Cognition* (Hennacy Powell 2024)—and he is founder and director of the Neuromeditative Institute in Eugene, Oregon, which among other services offers psychedelic integration therapy, ketamine assisted therapy, and vibroacoustic therapy.

Finally, Rupert Sheldrake, who holds a PhD in biochemistry from Cambridge University, is brought in to add some weight and to attack science. According to the *curriculum vitae* on his website (https://www.sheldrake.org/), Sheldrake worked in biology early in his career, but for several decades now he has been a proponent of psychic phenomena. He wrote the 1999 book *Dogs That Know When Their Owners Are Coming Home, and Other Unexplained Powers of Animals* and the 2003 book *The Sense of Being Stared At, and Other Aspects of the Extended Mind*. In 2016, he published a dialogue with Michael Shermer of *Skeptic* magazine, *Arguing Science: A Dialogue on the Future of Science and Spirit*, and, more recently, he participated in a public debate with Shermer on the subject of the "Edges of Knowledge" (Institute of Arts and Ideas 2023).[1] In *The Telepathy Tapes*, he is not shy about his view of science: "Most scientists have been brought up on materialism … The influence of this materialist dogmatism is very strong, and what they try to do is say that any educated person would agree with them. Anyone who doesn't agree with them is stupid, uneducated, ignorant, superstitious" (episode five).

Although they all seem like lovely people and their graduate degrees will impress some listeners, this is not an objective or representative group of experts. Rather, it is a group of people who can be expected to substantiate the reality of psychic phenomena, and that's exactly what they do. Experts not heard on *The Telepathy Tapes* include Committee for Skeptical Inquiry Fellows Christopher French, Richard Wiseman, James Alcock, and Susan Blackmore. Furthermore, CSI Chief Investigator Kenny Biddle is not a guest on the show, and there is no mention of the Center for Inquiry Investigations Group and their $500,000 challenge to anyone who can demonstrate psychic ability under controlled conditions ("Doubling Down" 2023). With all the psychic excitement being reported in the podcast, one would think half a million dollars would be an enticing reward. I'm not psychic, but I predict none of these more skeptical experts will appear in season two of *The Telepathy Tapes* and that none of the people with psychic ability mentioned in the podcast will ever approach the CFI Investigations Group to pick up the prize money.[2]

So, the good news—if there is any—is that the sheer weight of paranormal and supernatural ideas being promoted on the *Telepathy Tapes* podcast may strain credulity for some people and that the experts appearing will be seen—at least by some—to be onboard with the fringe supernatural from the get-go.

Tragic Autism Pseudoscience

But the bad news is that this show is likely to increase the popularity of several pseudoscientific and potentially dangerous forms of communication: facilitated communication, rapid prompting method, and spelling to communicate. The majority of the voices on the podcast are of the parents of nonspeaking children and adults with autism—or their teachers—who are using these discredited methods of communication and who believe not only that the person with severe autism is speaking but that they also have psychic abilities. As I have described in several previous articles, these methods all involve input from another person who either holds the hand of the

1. To his credit, in this debate with Shermer, Sheldrake says he subscribes to Skeptical Inquirer magazine.

2. In case the podcast producers were unaware of CFI's $500,000, challenge, I wrote to *The Telepathy Tapes* on January 3, 2025, at the email address given on the show website to inform them about it and provide a link.

nonspeaking person as they type on a keyboard (facilitated communication) or holds a letter board in the air—often quite unsteadily—while the person with autism points at letters (rapid prompting method and spelling to communicate). The evidence suggests the words are coming from the helper, not the nonspeaking person, and the influence of the helper is unconscious in a Ouija-like phenomenon. Nonetheless, the nonspeaking person is being manipulated by the communication partner.

Due to the dubiousness of these methods, over thirty professional and advocacy organizations worldwide, including the American Psychological Association and the American Academy of Pediatrics, have written position statements against the use of facilitated communication ("Organizations with policies opposing" n.d.), and the American Speech-Language-Hearing Association (ASHA) has published position statements against both facilitated communication (https://www.asha.org/policy/ps2018-00352/) and the letter board methods (https://www.asha.org/policy/PS2018-00351/). In recent articles, I have reported how these methods were implicated in the real sexual abuse of a man with profound autism by former philosophy professor Anna Stubblefield and false charges of sexual abuse and the unjust imprisonment of a man in Virginia (Vyse 2024a; 2024b). These are not harmless methods, and there are many such cases. These are just two recent examples.

The podcast's host, Ky Dickens, never questions the veracity of these communications, and like many advocates, she and her guests repeatedly accuse critics of facilitated communication and the letter board methods of ableism and attempting to silence autistic voices. Tellingly, these critics are kept off stage and not invited on the program to speak for themselves. They are merely (mis)characterized by the believers. All the voices on the podcast—except for a brief moment of purported skepticism by the cinematographer—are of true believers, and the importance of believing is repeatedly stressed, as is the mantra of facilitated communication, "presume competence,"

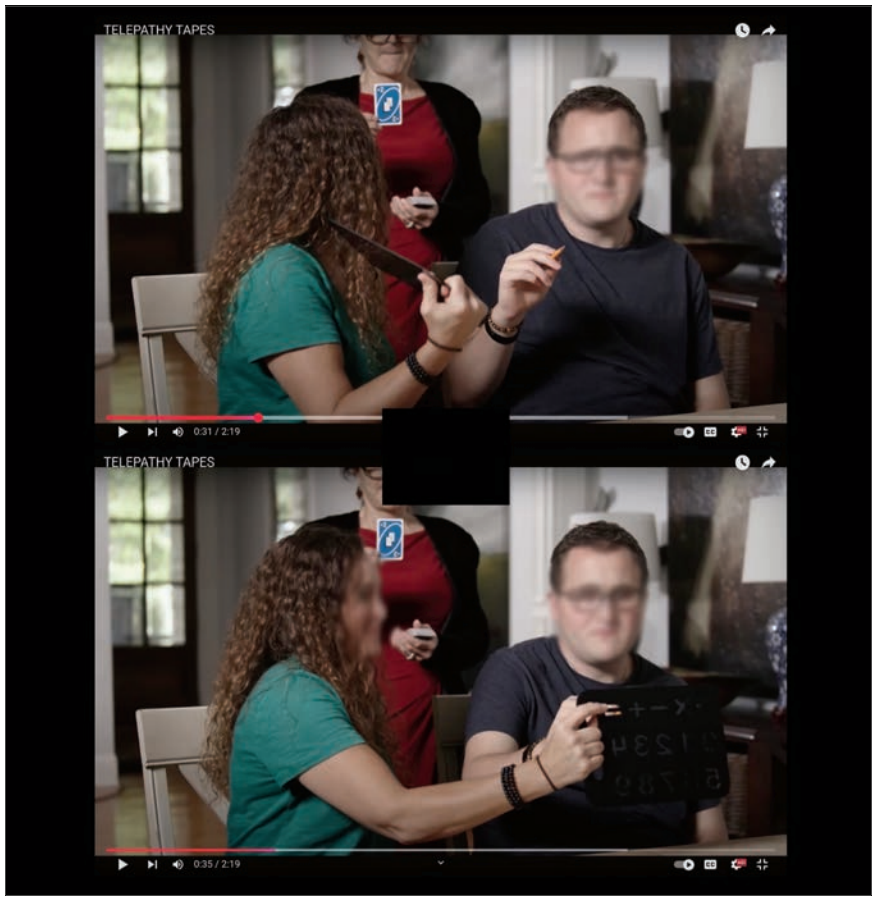

Figure 1. Two screenshots with time stamps from the trailer to *The Telepathy Tapes*. The young man is purported to be psychically reading the number on the Uno card held behind him. (YouTube)

a hopeful sounding phrase that introduces an explicit bias in favor of belief and against doubt.

The Evidence

The Telepathy Tapes is a podcast, so naturally it is largely audio without accompanying images. Most of the amazing things cannot be witnessed directly. However, the producers' stated goal is to raise funds to make a feature-length documentary, and as a result, much of the material has been recorded in video. The podcast's website includes several video clips from the telepathy tests performed on the show, but to watch them you must pay a $10 membership fee, which, in the interest of thorough reporting, I did. I would love to use these clips to demonstrate the enormous problems with these tests, but because the producers have superimposed large copyright symbols on every frame and this is a print magazine, I will have to make do with what I can: screenshots from the series trailer and descriptions of two tests from the podcast.

In episode three, a young man with autism appears to psychically identify the numbers on Uno cards held behind him, where he presumably cannot see them. He uses a form of spelling to communicate to identify the number. In the top panel of Figure 1 at thirty-one seconds into the trailer, Diane Hennacy Powell is showing the Uno card +2, which the young man's mother can see. This shot also shows the young man holding a pencil, which he will use to poke at numbers in the stencil his mother is holding. In the lower panel of Figure 1, taken four seconds later, the young man's mother is holding the stencil floating in the air as he pokes at it with his pencil in a classic form of spelling to communicate.

Due to the mother's direct involvement holding the stencil in the air, it is unclear whether the communication is coming from her or the young man—and, of course, she knows the correct answer. If we assume the mother and not

the young man is controlling the number identification, then the telepathy disappears, and it is just an everyday case of transcription.

The psychic test that so impressed the cinematographer in episode one involved a blindfolded girl sorting colored popsicle sticks. The basic setup is shown in Figure 2, another screenshot taken from the trailer. The girl is seated at a table with four different colored popsicle sticks,[3] and she is blindfolded. In the paywalled test video, the girl's mother is seated on a couch next to her, and the mother's hand is on top of the girl's blindfold. For each trial, the mother hands the girl a popsicle stick, and the girl's job is to move her hand left or right to the correct spot and drop the popsicle stick. The mother's hand is on the girl's forehead the whole time, and, of course, the mother can see the array of popsicle sticks on the table. To my eyes, the mother appears to move the girl's head back and forth as a prompt to where she should drop the stick. In one case, when the girl was hesitant and the correct pile was to her far left, the mother appeared to be pushing the girl's head very far to the left side. It's possible that the girl is in charge and the hand is just riding on the forehead, but in that case, what is the mother's hand doing? The film clip provides an obvious alternative, non-psychic explanation for what is going on, but it is never explored. The filmmakers accept the results on face value. No one thinks to ask, "Can she do it *without* your hand on her head?"

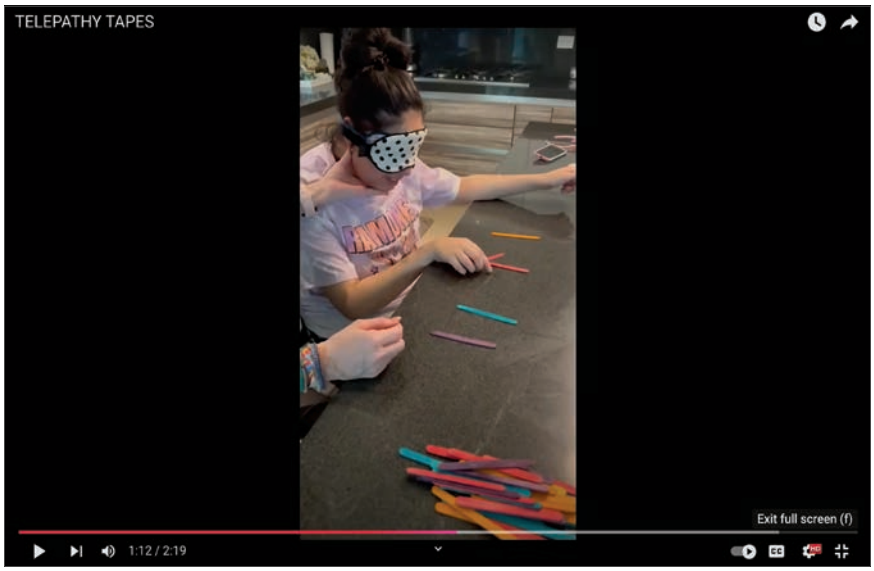

Figure 2. A screenshot from the trailer to *The Telepathy Tapes* showing a blindfolded girl doing a sorting task with colored popsicle sticks. The image also shows someone holding her chin. (YouTube)

A False Narrative

Before we can determine whether anything paranormal is happening here, we need to know if the communications are genuine. Unfortunately, over the long history of these methods there have been no studies that show that the authors of the communication are the nonspeaking individuals—and it would be exceedingly easy to prove. In *The Telepathy Tapes*, the producers provide seven episodes of heartwarming stories of psychic communication before briefly addressing the critics of these techniques in the first third of episode eight, titled "The Gatekeepers of Truth." The producers interview a man named Joe who is described as a special needs minister from Highland Church in Arizona. Joe characterizes the research evidence this way: "I actually looked at some of the academic literature on this. And what I found was forty or so negative papers were earlier on in the process back in the 90s. Then at one point, the spellers improved their methodology. You find later on, there's like over 100 papers that are now saying, wait a minute, we missed something here."

Joe's account is how the proponents of these methods often describe the history: yes, there were some problems back in the 1990s when facilitated communication was introduced, but these new methods don't involve touching the nonspeaking person, so we have cleaned up our act. Furthermore, there is new research that shows these letter board methods work.

In contrast, I would describe the history this way: When facilitated communication was introduced in the 1990s, several studies were conducted to determine whether the authorship of the communications was the facilitator or the nonspeaking individual, and *all* these studies clearly showed that *the facilitator and not the nonspeaking person* was controlling the typing. The facilitators were unaware they were doing the typing, but they were. These findings were reported in a devastating 1993 PBS *Frontline* documentary, *Prisoners of Silence*, that you can watch for free at https://archive.org/details/PrisonersofSilence, and for a time these methods went out of fashion.

Then the newer letter board techniques were introduced that had the benefit of not requiring the communication partner to touch the nonspeaking person but, for reasons that have never been clear, required someone to hold the target, a letter board, stencil, or keyboard, floating in the air. This involvement of another person in the process of spelling raises the same questions of authorship. Is the nonspeaking person controlling the typing or is the communication partner prompting the right response? Why can't the letter board be placed on the table or an easel eliminating the need for a communication partner?

But what about those 100 papers? First, there aren't 100 such papers. Second, none of the papers that do exist in support of these newer letter board methods employ the simple tests of authorship that produced the negative results in the 1990s. Not a single one. Apparently, the proponents of the new methods have learned a lesson from the 1990s: don't submit to testing. This philosophy is most directly expressed in the pro-letter board film *Spellers* (Spellers Freedom Foundation 2024). Vaishniavi Sarathy, who holds a PhD in chemistry,

3. In the podcast, host Ky Dickens mentions six different colored popsicle sticks, but the test video shows only four colors being used.

appears in the movie and says, "When a child is communicating, we don't need the science." Sarathy, also the mother of Sid, a nonspeaking child featured in the film, says, "I don't want the science. I want Sid to talk. I don't care about the science. I know that Sid is talking." The attitude adopted in *Spellers* and in *The Telepathy Tapes* is one of belief over evidence and strident advocacy over open-minded questioning.

The Stakes

In my view, this is a tragic circumstance. It would be wonderful if what these people believe were true, and the evidence is so easy to obtain. All that is required is to ask the nonspeaking person a simple question when the communication partner does not know the answer. Show a picture of a shoe, boat, or dog to the nonspeaking person without the communication partner seeing it, and ask the child to identify it. That's all. It can be done any number of ways with very little equipment. The methods are demonstrated in *Prisoners of Silence*, and there is no need for the five GoPro cameras employed on *The Telepathy Tapes*.

Given the prejudice and push-back these parents and teachers have endured, which they express quite movingly in *The Telepathy Tapes*, you might imagine they would leap at the chance to prove that their children and students are the ones communicating, but this has not been the case. They have chosen belief over evidence.

For the nonspeaking children and adults, the stakes are very high. On the one hand, if they are really the ones speaking, then they deserve to use these methods in school and work settings if they wish. However, if—as the empirical evidence suggests—they are not the ones spelling and typing, then they are being manipulated by others, and, in my view, their human rights are being violated. I have spent a lot of time in these waters, and as I watch videos such as those in *Spellers* and on the *Telepathy Tapes* website, I am struck by how the children and nonspeakers who are supposed to be at the center of the story are merely incidental to a scene that is all about the parents and adults.

Screenshot from an Instagram video showing a father using a combination of facilitated communication and spelling to communicate with his autistic son.

Consider a video posted on Instagram at https://www.instagram.com/p/C_-ln0iO6i6/ in September 2024. A screenshot from the video is shown above. The father in the video is using a combination of facilitated communication and letter board methods because he is holding his son's arm as well as holding the letter board. The father is looking intently at the letter board as words are tapped out, but the son almost never looks at the board—which means he would have to be psychic to be the one communicating. To me, this is a sad and troubling sight. The young man appears completely dominated by his father, who could duplicate the same performance using a doll.

My heart goes out to these parents. Early in my career, I worked with children with severe and profound autism like the ones in these videos, and as a result I know something of the enormous challenges these parents face. In a free society, parents have great control over how their children are raised, but if these children's communication methods are false, then countless hours have been wasted in an effort to produce a miracle for the people who love them. It is easy to understand a parent's desire to find an intelligent, social being inside a severely disabled child, but I believe every child deserves to be seen and loved for who they are. Furthermore, they deserve the kind of education that will help them flourish to the greatest extent possible. The cloud around these communication methods obscures who these children really are and what education is best for them, and the greatest tragedy of all is that it would be very easy to remove the cloud. All that is required is to ask the question and have the courage to accept the answer.

* * *

Postscript: If you are interested in additional information about these communication methods, a group of professionals and advocates, me included, have established the website facilitatedcommunication.org. It is a volunteer effort operated at our own expense. ■

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[THE PRACTICAL SKEPTIC MICK WEST

Mick West is a writer, investigator, and debunker who enjoys looking into the evidence behind conspiracy theories and strange phenomena and then explaining what is actually going on. He runs the Metabunk forum and is the author of the book *Escaping the Rabbit Hole*.

Mysterious Drone Sightings: Give Me the DTLs (Dates, Times, Locations)

The first press conference of the Trump administration, on January 28, 2025, began rather oddly. White House Press Secretary Karoline Leavitt gave the following statement:

> I do have news directly from the president of the United States that was just shared with me in the Oval Office, from President Trump directly, an update on the New Jersey drones: After research and study, the drones that were flying over New Jersey in large numbers were authorized to be flown by the FAA for research and various other reasons. Many of these drones were also hobbyists, recreational, and private individuals that enjoy flying drones.

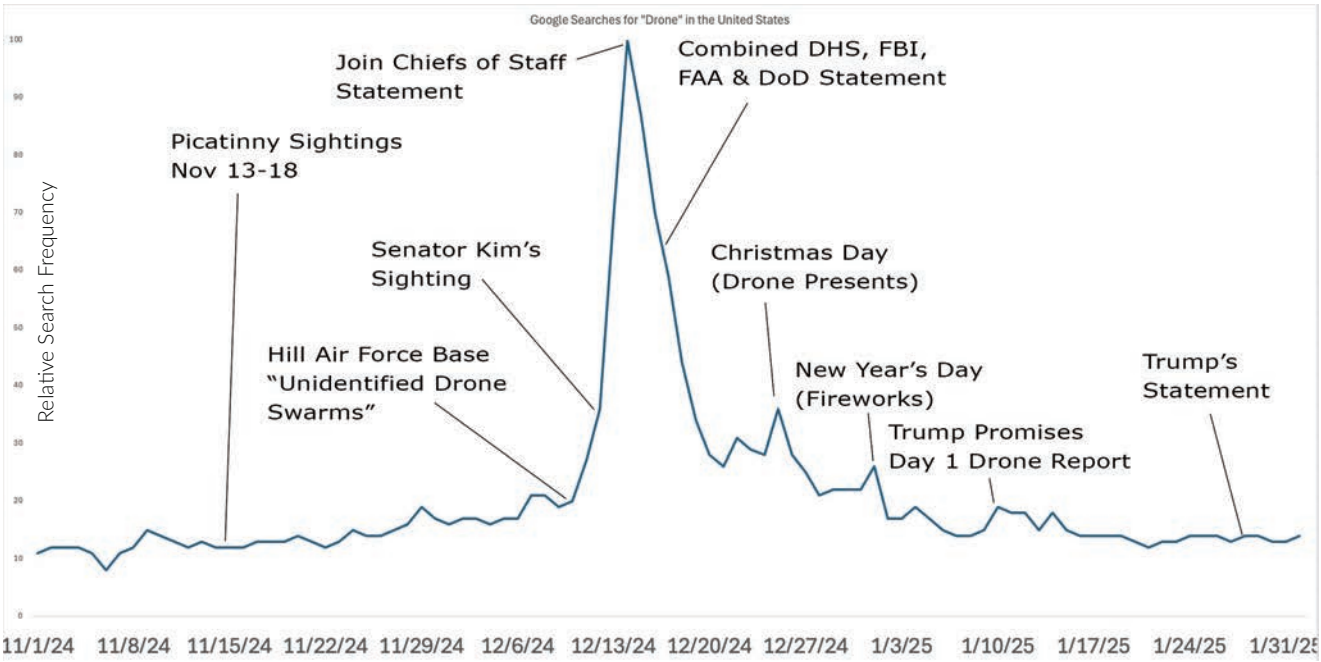
Leavitt added, "In time, it got worse due to curiosity. This was not the enemy."

This somewhat confusing statement briefly reignited an instance of what we refer to as a "flap"—a sudden, often short-lived, topic that rapidly gains both media and public attention in a rapid feedback cycle. In the skeptical community, we are familiar with UFO flaps such as the 1997 Phoenix lights flap or the 1947 flying saucers flap. However, flaps can be about any topic that attracts public and media attention.

In this case, Trump was referring to a drone flap. This started on November 13, 2024, when a contractor at Picatinny Arsenal in New Jersey noticed a light in his rearview mirror. From his perspective, he could not tell if it was a plane or a drone, so he reported it to his superiors (Wilson et al. 2024).

Drone incursions are a real issue at military bases, so the alert went out, and more reports came in. The situation simmered for a while. Then, on December 10, the U.S. Air Force issued a statement that began, "Unidentified drone swarms have recently been observed over several U.S. military bases" (75th Air Base Wing Flight Safety 2024).

This began the full-bore feedback cycle where the media reported there were mysterious drones, the public looked up in the sky and saw what they took to be car-sized drones and posted videos of them online, and the media used those videos as evidence of something happening. People then demanded



Like with most "flaps," growth in interest in drones (measured by Google search trends) rose exponentially, then fell off just as quickly.

more answers and took more videos.

Within a few days, it had escalated to front-page news on all the major media outlets and resulted in a frantic scramble from officials as they sought to balance accuracy, security, and the demands from the public and politicians. Suddenly, the joint chiefs of staff were issuing statements, the FAA was shutting down airspace, and Donald Trump was changing his golfing plans as giant drones invaded New Jersey.

It's a Plane!

The problem here is that none of this, other than a few illegal but inevitable drone incursions over military bases, appeared to be real. Along with other hobbyists on my Metabunk forum, I have become quite adept over the years at recognizing and tracking down planes seen in videos that had been misidentified as UFOs. So, we immediately got to work.

With countless photos and videos posted online, there was no shortage of material. The first thing that we noticed about them was they fell into one of two categories: they either looked exactly like planes, or they were ambiguous lights in the sky that could be anything. There was literally *nothing* that was unequivocally a drone.

The problem here, from a practical skeptic's perspective, is how you convince people of this. If people are sure they just saw a drone, then telling them "it was a plane" isn't going to cut it without proof. Nobody likes to be told they didn't see what they thought they saw. So, pointing out how their video resembles a plane might make them double down on their belief that they saw drones and that you are either mistaken or part of some disinformation effort.

Fortunately, there's more definitive evidence we can use.

Give Me the DTLs!

The large number of cases that were just being shared as a video with only the most general description of time and location prompted me to invent a new acronym to help communicate the need for more details. This technique is something I described in my July/August 2023 SI column, "Inventing Skeptical Language."

To identify some lights in a video when those lights are probably planes, you need three things: the date, the time, and the location. It's also helpful to have the direction. Once you have that, you can use the techniques I outlined in "Quick Guide to Modern Video Analysis Techniques for UAP (and UFOs)" (SI, January/February 2025) to find the plane.

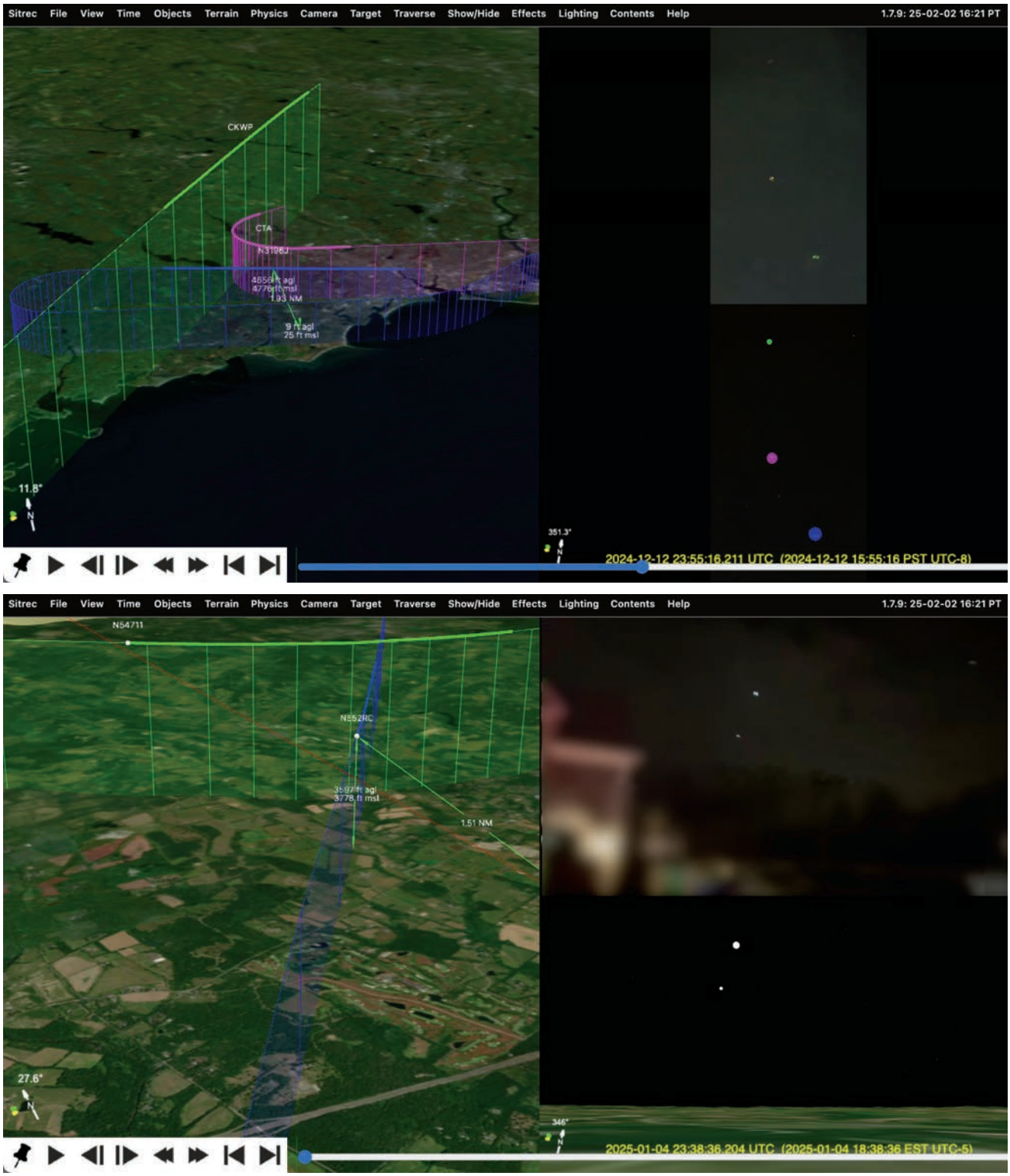
I referred to this as "the DTLs" (the date, time, and location, pronounced "the details"). Every time a new case came up, I asked, "Where are the DTLs?" I even said it during an interview on CNN.

Eventually, it caught on, at least within the somewhat limited community of people who are interested in investigating mysterious drone sightings. Other people began to ask for "the DTLs." When these details were available, we were able to quickly find which plane (or planes) people were looking at and then demonstrate it with 3D reconstructions.

The next problem was simply the high number of cases. Investigating each one was usually straightforward, but doing a good job would still take at least thirty minutes to an hour. For a bunch of hobbyists, simply investigating every case was fun but not a particularly effective use of time. If we wanted to make a difference, we'd need to focus on high-profile cases that got media attention.

Lucy Biggers

One such case was that of Lucy Biggers, a social media correspondent for The



Top: Lucy Biggers's sighting in Connecticut. The 3D reconstruction of normal air traffic (lower right) shows a perfect match with her video (upper right).
Bottom: This sighting near Trump's golf course in Bedminster (seen in the low portion of the map) also matched normal air traffic.

Free Press (TFP). On December 12, as the flap was peaking, Biggers was at the Fairfield, Connecticut, train station. Looking to the north, she saw three sets of lights in the night sky in an odd triangular formation. Assuming these were the giant drones everyone was talking about, she videoed them, and the video was shown on TFP.

Biggers was then interviewed by Fox News, which showed her video as she repeated the story of seeing giant drones at low altitudes. She said what she saw "did not look or sound or act like planes" (Fox News 2024).

TFP interviewed me, and I explained that I thought they looked like regular planes. I then quickly geolocated one of Biggers's videos and demonstrated there was a plane right there. Biggers saw this and later contacted me to ask how I figured out it was a plane. She also asked about the other lights in her video. We agreed to meet online to discuss it.

Biggers's case was good because we had the date, time, and location. We also had a distinctive configuration of three objects, making a triangle in the sky. I pulled up her video and entered the exact time into ADS-B Exchange (Automatic Dependent Surveillance–Broadcast). We knew where she was standing, so I zoomed in on that location. Immediately, it was clear that there were three planes just to the north of where she was filming.

I downloaded the 3D tracks and dropped them into Google Earth and then into my 3D recreation app, Sitrec. I then set the camera to where she was standing. The 3D recreation and the video were a perfect match. Case closed. Biggers was a little embarrassed but happy that a solution had been found.

Bedminster Golf Course

"Drones" were being reported all over New Jersey, and some were reported in Bedminster, the site of one of Trump's golf courses. Understandably nervous after two assassination attempts, Trump said he was changing his travel plans and not going to Bedminster to play golf.

One of the most dramatic videos was posted on January 4, 2025, by Tina Dadas, a resident of the gated community adjacent to the golf course. Like the Biggers video, it showed multiple objects, two in this case, seeming to circle near the Bedminster Golf Course.

Dadas had posted the date and time of her video (6:38 p.m.) and the approximate location of her house. So, it was an easy matter to identify what she was looking at. Again, planes were found, a 3D reconstruction was made, and the case was solved.

'But I Checked Flightradar24!'

A common factor with these and other sightings was the insistence of the videographer that they had checked a flight tracking app and had verified that what they had seen was not a plane. Biggers said this on her Fox News interview. Dadas was quite emphatic, posting, "I did confirm they were not airplanes by the flightradar24 app" (Dadas 2025).

They were both wrong. These apps are hard to use for a beginner. People often get the time wrong, because the apps need it in the Coordinated Universal Time format. They will often zoom in far too much, thinking that the planes are overhead when they are actually several miles away.

This misunderstanding is not limited to members of the public. Senator Andy Kim of New Jersey accompanied local police out to the Round Valley Reservoir, where they saw what they thought were drones. Kim posted on X, getting seven million views: "We oriented ourselves with a flight tracker app to help us distinguish from airplanes. We often saw about 5–7 lights at a time that were low and not associated with aircraft we could see on the tracker app" (Kim 2024).

In reply, I posted a map of the local air traffic, showing that planes actually were there. Kim probably did not see my post, but he conferred with others and a day later posted a thread saying he got it wrong and what he was looking at actually were planes.

What Happened?

A sitting U.S. senator, one of our highest government officials, together with local police got it totally wrong and misidentified planes as drones. He was far from alone. TV reporters gave live broadcasts where they pointed at planes and said they were drones. Major news programs ran interviews with drone experts while they played loops of planes in the background, thinking they were drones. Two professors from Rutgers related how they saw a "large drone" fly over their house while in the hot tub, but that was a Cessna 208B heading straight to Newark International.

We might find this amusing as skeptics, but it's also concerning. Millions of people became convinced this was a real thing. A lot of time and money was wasted by officials trying to solve the mystery drone problem when the answer was too embarrassing to admit—that there were hardly any drones. *Every single case* where we had good details turned out to be a plane or other innocent object.

Trump obviously had other things on his mind, but he said he'd tell people what the drones were, so he got his staff to make a statement. That statement added nothing at all to a far more comprehensive statement that was issued on December 17, 2024, by the DHS, the FBI, the FAA, and the DoD (DHS et al. 2024). They explained that what we were seeing was just misidentifications. That should have been the end of it.

There's still a hardcore group of believers who are going out each night, looking at planes and planets, and saying they are drones. A few local politicians are still demanding answers for why drones are still flying over their neighborhoods. Trump's statement added a little unnecessary fuel to their fire, but hopefully this particular flap is nearly over. ■

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[INSIDE IMMUNITY

ANDREA LOVE

Andrea Love, PhD, is an immunologist and microbiologist with over a decade of experience. She is a subject-matter expert in infectious disease immunology, cancer immunology, and autoimmunity and is adept at translating complex scientific data and topics for the public and healthcare providers. Love is the author of *Immunologic*, a newsletter and science information hub, and is the executive director of the American Lyme Disease Foundation.

Cancer Misinformation Kills; Chemotherapy Saves Lives

As an immunologist who works in biomedical research, I know misinformation and pseudoscience about cancer is not only frustrating but also extremely dangerous. And if any of you watched the recent Netflix series *Apple Cider Vinegar*, let me tell you: that is only scratching the surface of dangerous lies that circulate in wellness spheres.

One of the most pervasive—and deadly—myths about cancer is that chemotherapy kills more people than cancer itself would. This anti-chemo rhetoric is popular among wellness influencers, medical conspiracists, and alternative practitioners. These individuals promote the lie that chemotherapy is a scam and a poison created by "Big Pharma" and pushed by doctors for profit while hiding the natural cures for cancer. Even though we have decades of data that shows this is false, this narrative continues to be spread by those who profit off it.

Understanding Chemotherapy

Like nearly all pseudoscience, the myth that "chemo kills more than it saves" has a nugget of reality baked within it. Some of that is based on fundamental misunderstanding of cancer and chemotherapy.

Cancer is a term that represents hundreds of different diseases, with nearly 200 different *types* of cancers currently categorized. But even within those types, every single cancer is going to be genetically unique to the patient, because cancer occurs when our own cells stop responding to the growth and regulatory signals within our body and start to uncontrollably reproduce.

Cancers all share certain hallmarks, but every cancer is distinct. One person's breast cancer is not identical to another person's breast cancer. In cancer, cells stop behaving like the cells they started from, allowing cancer cells to ignore signals telling them to stop dividing or die. This allows them to extend their life span, grow uncontrollably, and grow in places they don't belong.

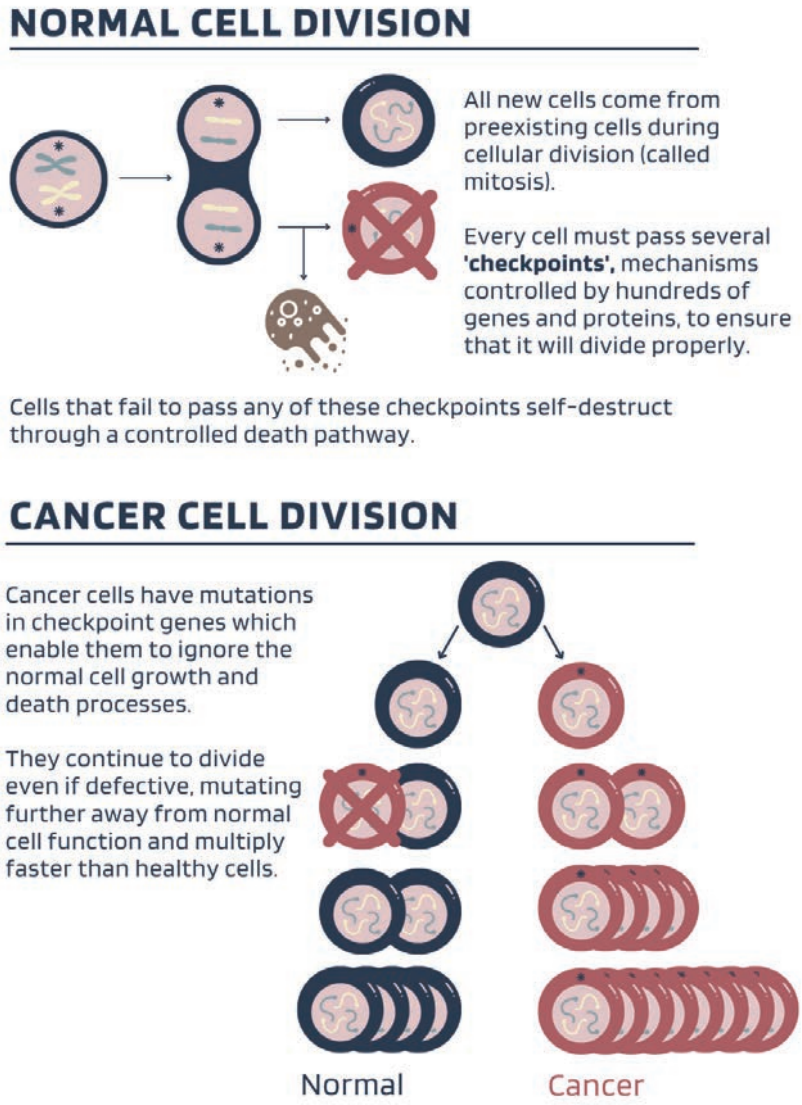

NORMAL CELL DIVISION
All new cells come from preexisting cells during cellular division (called mitosis).
Every cell must pass several 'checkpoints', mechanisms controlled by hundreds of genes and proteins, to ensure that it will divide properly.
Cells that fail to pass any of these checkpoints self-destruct through a controlled death pathway.
CANCER CELL DIVISION
Cancer cells have mutations in checkpoint genes which enable them to ignore the normal cell growth and death processes.
They continue to divide even if defective, mutating further away from normal cell function and multiply faster than healthy cells.
Normal
Cancer

Figure created by Andrea Love and Ilze Abersone

Chemotherapy is a catch-all term representing chemical compounds that interfere with these growth processes. The challenge is that cancer cells are *your own cells*—just ones that have mutations that cause them to misbehave. As a result,

chemotherapy medications will also affect healthy cells, but the goal is for chemotherapy to target cancerous cells faster than healthy cells—to eliminate the cancer while minimizing the side effects.

Chemotherapies include many different categories of medications: some damage the genetic material in cells and prevent them from reproducing; some mimic natural building blocks of cellular molecules to interfere with cell division; others block enzymes required to replicate DNA—an essential step in cell division; some block structural proteins that are required for the physical cell division process (called mitosis). Ultimately, these chemicals accomplish similar goals: to interfere with the processes by which cancer cells grow and spread.

These chemotherapies unavoidably also attack healthy cells. This is the reason chemotherapies can have side effects. This is why people experience symptoms such as nausea or hair loss when undergoing some types of chemotherapy; the rapidly dividing cells of your stomach and hair follicles are also victims of chemotherapy. But it is important to understand this trade-off: the risk of dying without treatment is far greater. That math is part of the review for any FDA-approved medication, and in the case of cancer, that math is going to be different compared to something such as hypertension.

We have had immense improvements in cancer outcomes over the past sixty years, thanks in large part to chemotherapies. Acute lymphoblastic leukemia (ALL) is a blood cancer where immature white blood cells grow out of control. ALL is the most common pediatric cancer, accounting for 25 percent of all pediatric cancers. ALL particularly affects young children, with 75 percent of cases occurring in children under six (National Cancer Institute 2025b). In the 1960s, the survival rate for ALL was 10 percent. Today it is over 90 percent because of chemotherapies such as vincristine (Demidowicz et al. 2019; Sasaki et al. 2021; Hunger et al. 2012).

Hodgkin's lymphoma is a blood cancer where specific white blood cells, lymphocytes (memory immune cells) grow out of control. It is characterized by the presence of a specific type of cell, Reed-Sternberg cells, which differentiates it from non-Hodgkin's lymphoma. In the 1970s, Hodgkin's lymphoma had a survival rate of around 56 percent. Today, it has a survival rate of 87 percent because of chemotherapies (Hannuksela et al. 2024; Borchman et al. 2012).

Testicular cancer was fatal in nearly 95 percent of cases before the development of the chemotherapy cisplatin in the 1970s. Today, as a result of chemotherapeutics, survival exceeds 95 percent, even when cancer has metastasized (spread to other regions of the body) (National Cancer Institute 2025a; Einhorn 2002).

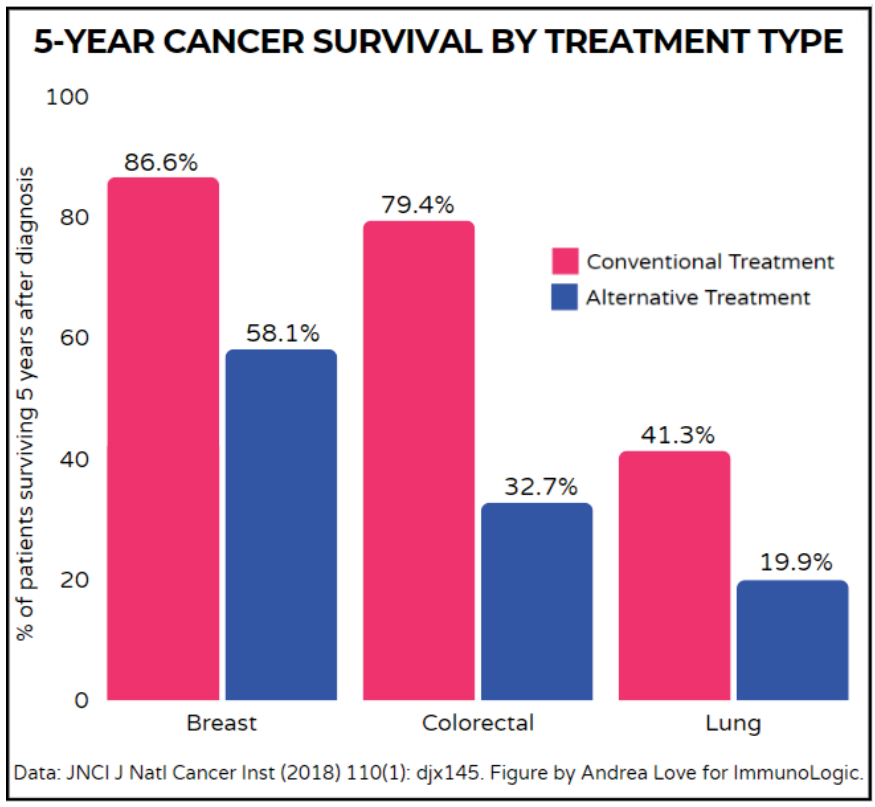
HER2-positive breast cancer is characterized by overexpression of the protein HER2. Regular expression of HER2 leads to normal growth, but overexpression leads to excess cell growth and more aggressive cancer. Previously, HER2-positive breast cancer patients had a five-year survival rate of 68 percent compared to 96 percent for HER2-negative breast cancer patients (Tovey et al. 2009). Today, with chemotherapy and HER2-targeted medications, survival for HER2-positive breast cancer approaches that of HER2-negative breast cancer (Bradley et al. 2021).

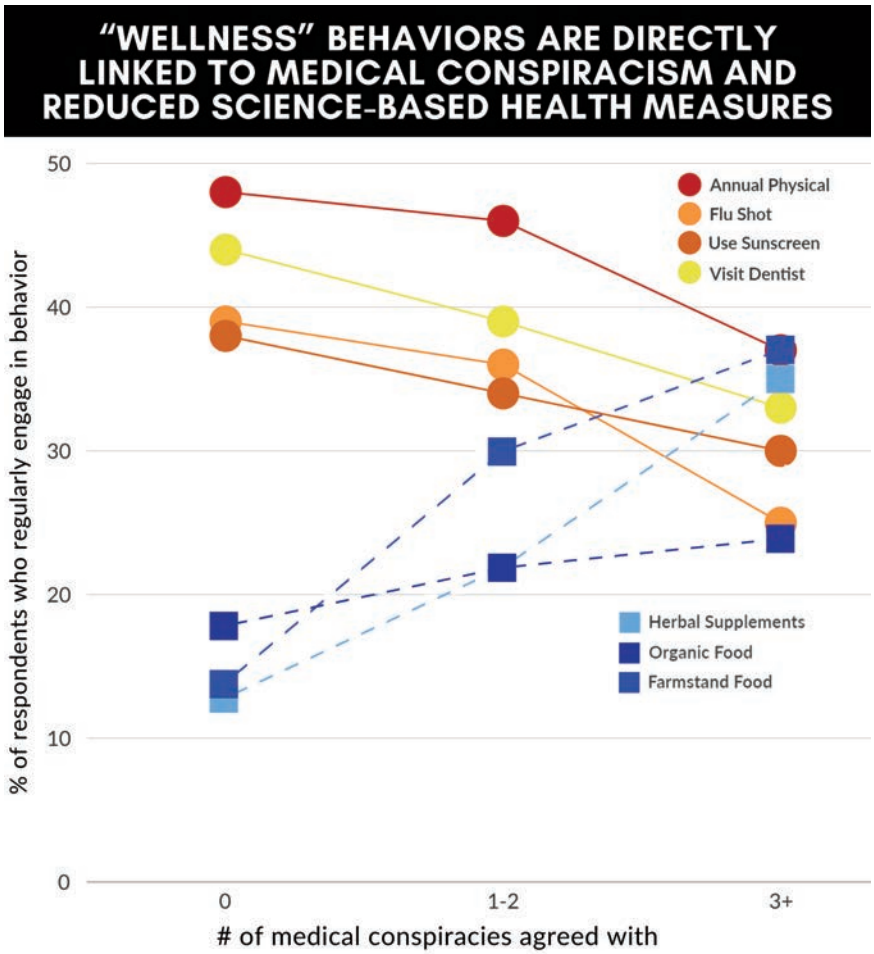
These improvements and others aren't accidental; they are the direct result of decades of scientific research, therapeutic development, and rigorous clinical trials all conducted by people who have devoted their lives to solving the mysteries of cancer.

Wellness Disinformation Causes Suffering and Death

No matter the cancer, prompt intervention after detection is critical to improve survival. The longer a cancer can progress without intervention, the higher the chances are that cancer grows or spreads in a way that makes treatments less effective. When cancer patients refuse chemotherapy and other supported treatments and instead use "alternative treatments," survival rates plummet.

Studies of the use of alternative medicine for cancer have shown that patients who refuse conventional treatments and rely on unsupported therapies die more often and faster. One such study looked at several different cancers. Breast cancer patients who rejected chemotherapy had a 5.68-fold higher risk of death. Five-year survival dropped from 86.6 percent to 58.1 percent. Patients with colorectal cancer had a 4.57-fold increased risk of





Data: JAMA Intern Med. 2014;174(5):817-818. Figure created by Andrea Love.

death, and five-year survival plummeted from 79.4 percent to 32.7 percent. Patients with lung cancer had a 2.17-fold increased risk of death, with five-year survival declining from 41.3 percent to 19.9 percent (Johnson et al. 2018). These are not trivial differences. It's the difference between life and death for many of these people.

The wellness industry thrives on distrust of medicine, pushing the false claims that the "real" cancer cures are being suppressed because doctors want to keep patients sick by poisoning them with chemotherapy for money. This medical conspiracism is the foundation of the wellness industry's business model.

If you convince people that science-based medicine and credible healthcare providers are the villain, you can get them to opt in to the alternatives you're promoting. One study showed that as the number of medical conspiracies someone believed in increased, so did the number of "wellness" behaviors, such as taking herbal and dietary supplements and buying organic foods (Oliver and Wood 2014). More concerning, this was paired with a decline in participating in evidence-based measures: wearing sunscreen, going to the dentist, getting an annual physical, and getting flu shots. You know—things that actually *improve health outcomes* (Love and Suleta 2024).

The number one conspiracy that respondents believed is that the government is hiding "natural cures for cancer," a belief that costs people their lives. Patients who opt for alternative treatments are also less likely to use conventional treatments in conjunction (Johnson et al. 2018). Thirty-four percent of patients receiving alternative treatments refused any sort of chemotherapeutic, compared to 3 percent of patients receiving other conventional treatments. This delays supported treatments until cancer progression limits effective treatment options and increases risk of death.

Who Chooses Alternative Treatments?

Patients who opt for alternative cancer treatments tend to be younger, White, female, more affluent, and moderately—but not highly—educated. Sounds like the target demographic for the growing wellness industry, right?

Wellness products advertised to treat cancer are the same as those hawked to improve immunity, longevity, hormones, metabolism, and more (Miller et al. 1998; Clarke et al. 2015). These include alkaline diets, dietary supplements (including intravenous vitamin C, herbal remedies, megadose vitamins, "detox" blends), homeopathy, chiropractic, ozone therapy, coffee enemas, rigid dietary interventions, and more (Gorski 2015). Not only do these have no evidence to support their use, but many pose serious risks, especially to cancer patients (U.S. Food and Drug Administration 2024).

The hypocrisy of it all is that the wellness industry is an unregulated $5.6 trillion-dollar global industry—with very little supporting evidence. Perhaps it needs to be more widely known that the dietary supplement industry is valued at $177.5 billion dollars and has no quality, safety, or efficacy oversight.

The wellness industry is not actually concerned with wellness. If they were, they wouldn't be selling unsupported and untested interventions that cause people to die. While they rail against the supposed greed of Big Pharma, they have no problem charging desperate patients thousands of dollars for useless (and often dangerous) treatments. "Follow the money" indeed!

Nobody Is 'Hiding' Natural Cures

While many of these individuals promote "natural" remedies for cancer while undermining science-based treatments, they ignore (or perhaps are ignorant of) the fact that many of our supported cancer treatments are derived from natural chemicals. Docetaxel is a synthetic derivative of paclitaxel, a chemical from the Pacific yew tree that has been chemically altered to improve its effectiveness, reduce side effects, and enable its use in more cancer types (Love 2025). Topotecan is a derivative of camptothecin, a chemical isolated from the Chinese

happy tree. The chemical modifications make it safer, more bioavailable, more effective against a broader range of cancers, and reduces side effects (Love 2025). Our ability to harness nature and improve on it with our scientific knowledge and biotechnologies has led to incredible scientific innovations we have today. These innovations—not your local influencer's green smoothie—are saving the lives of those with cancer.

It's long past the time for "politeness" on these topics. Health misinformation is a threat to public health, especially when it comes to cancer, a category of diseases that are already poorly understood and incredibly difficult to treat. If you have cancer, you need real medicine. Chemotherapy is tough, but it works. People telling you otherwise? They're lying to you—and they're profiting while they do it. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Look into My Eyes Documentary: Feels over Facts

Q: **I recently watched a documentary titled *Look into My Eyes*, an uncritical look at the work of seven alleged psychics in New York City as well as their clients. My sister and I have our own opinions of the film—none particularly complimentary—but what does a professional skeptic make of it?**

—Steven G.

A: This query was forwarded to me by Barry Karr, who knows of my longtime interest in both psychics and documentary films. I had not seen *Look into My Eyes*, though I'd read a generally positive review of it in *The New York Times*. I set aside the clipping, but it was soon buried under the unrelenting cascade of other, more pressing skeptical matters.

At Steven's request, I watched the film, and, yes, I have notes. As of this writing, the film has an impressive 91 percent Fresh rating on the Rotten Tomatoes film review aggregator website, with the tagline: "A group of New York City psychics conduct deeply intimate readings for their clients, revealing a kaleidoscope of loneliness, connection, and healing." Produced and directed by Lana Wilson, who also did acclaimed documentaries—including *The Departure* (2017), *After Tiller* (2013), and *Taylor Swift: Miss Americana* (2020)—the film is currently streaming on HBO Max and Fandango platforms.

As someone who's spent time on both sides of the camera, I have mixed feelings about the film. On one hand, I appreciate how much effort and skill go into crafting a compelling narrative and the vast array of technical, artistic, logistical, and other considerations that go into making a film. Simply put: filmmaking is hard work, and pulling it all together into a watchable—never mind good—film is no easy task, regardless of the content. That being said, some critical thinking would have made *Look into My Eyes* a much better, more interesting, and more informative documentary.

The film follows seven New York–area psychics. More diverse in ethnicity than in age, all are personable, seemingly sincere, and generally likable (as successful psychics tend to be). Most of the film focuses on getting to know them as people: their lives, loves, and losses. While you could make a film about a group of other equally interesting people in a same field (professors, protesters, police, etc.), the psychics share common characteristics that make them ideal for a documentary that provides insight into their motivations and techniques. For example, a striking number of the mediums are aspiring actors and/or have an interest in theater, film, and art (in fact, the film follows one psychic into an audition for an improv class).

Their clients are varied; the first we see interviewed is a doctor struggling to deal with a young female patient who died under her care some thirty years ago; her question is, "How is she?" It takes a second to register the fact that she's asking the psychic *how a dead person is doing*. She's assured that the girl is doing fine in the afterlife, a reply that—true or not—comforts the distressed doctor.

We're then introduced to a pet psychic, who states upfront that—despite claiming to be in contact with the client's pet—she doesn't know whether the animal is alive or dead (which seems like

a distinction that would be significant to the animal, if not to the psychic). Another client seeks help from the psychic in understanding the inexplicable and seemingly bizarre behavior of her cat: "She's always leading me to the door, and she just meows at the door. And then she's tapping on the door [but] if I open the door, she doesn't try to escape, she walks away. I don't know what she's trying to convey." Space constraints in this column prohibit describing all the psychics, clients, and readings, but others include a man seeking information about his enslaved ancestor and an Asian woman who wants to know about her birth parents and why they gave her up for adoption.

Psychology of Mediumship

Some of the most interesting parts of the film reveal the psychology of mediumship. When asked "Do you doubt what you say?," one psychic replies, "I *hope* I'm not making shit up … I feel comfortable saying that most people who enter into work like this definitely, at least at the beginning, are like 'Am I making this shit up?' Right? Um, and then proof happens. You *know*."

It's not clear what proof is being referred to, but it's likely along the lines of validation by the client—which, though very compelling to laypeople, is inherently problematic due to the Barnum Effect and other cognitive biases. For example, research has shown that clients often credit psychics with specific, correct information they did not in fact provide (see Nyman et al. 1999).

The filmmaker probes a bit more, asking, "Is it all like improv?" to which the psychic replies:

> Yes … Because I don't know what is going to come out of me, like ever … It's all dipping into information, you know? Like that river or sea of information that ever is, was, or will be, right? In really good improv, those people are absolutely communicating psychically. How do you know that the things that you're hearing or seeing are not your imagination? I don't. And that doesn't even necessarily mean anything. Like, what is imagination? Is it … just, you know, energetic information that you're just processing? Does it really make a difference? Is there really a separation? And if it resonates with the person I'm talking to, then it doesn't f-----g matter.

After this brief exchange, the film briskly moves on to other psychics and clients, but it really deserves a more fulsome examination because this honest and remarkable exchange cuts to the core of psychic mediumship: Is it imagination and improv—states familiar to countless artists, musicians, actors, and others—or is the information coming from external sources (e.g., spirit guides or the dead)? Furthermore, not only is the psychic notably uninterested in validating the information (e.g., finding out whether what "she's hearing or seeing are indeed her imagination"), but she explicitly *says that it doesn't matter whether or not she's imagining contact with her clients' dead loved ones*. The truth of the information is irrelevant "if it resonates" with her client. As with *proof*, it's not clear exactly what she means by *resonates*, but presumably it's something along the lines of finding meaning, significance, validation, or comfort in the messages. As mentioned earlier, this is problematic territory that can only be reliably parsed through proper research design and investigation.

Real or Not? Who Cares?

There's a defense routinely encountered by skeptics: So what if people believe in Bigfoot? (In fact, people have died searching for the beast.) What does it matter if people believe in UFOs? (Victims of the Heaven's Gate suicides may have an opinion on the matter.) So what if people believe in absurd conspiracy theories? (The Pizzagate gunman did.) So what if someone believes in astrology? (That is until your employer decides not to hire an Aries because a stubborn personality would disrupt the workplace.) Sure, choosing crystal healings and homeopathy over science-based medicine can harm or kill people, but there's no harm in telling people you're talking to their dead loved ones—right?

But it's deeply problematic, for several reasons that *Look into My Eyes* deftly elides. First, *that's not what she's being asked or paid to do*; she's being asked to provide truthful, accurate information about an emotionally charged issue, whether it's the status of a missing beloved pet, how a friend died, or why she was given up for adoption as a baby. This sort of bait-and-switch scenario would be unethical in other circumstances. Imagine if any other person offering information told you upfront: "Thank you for hiring me. I'll take your money, but to be clear: I might just be making up anything I tell you; I really don't know. Also, I don't really care whether it's true, and won't make any effort to find out. As long as it resonates with you, that's what's important." Imagine getting that caveat from anyone else whose specialized knowledge you rely on, whether a doctor, financial advisor, or mechanic.

Second, *truth matters*—or at least it should—for various reasons, including that clients often act on the information they're given by psychics; beliefs have consequences. Let's say that a psychic tells a desperate missing pet owner that their beloved Fluffy is still alive, when in fact she's not. That person might spend weeks or months and thousands of dollars putting up missing pet flyers, scouring the streets and shelters, looking for their cat that may in fact be long dead. The same thing goes for relationship advice; someone told that their future husband will be tall and Italian, for example, may overlook a perfectly suitable life partner who doesn't fit whatever image the psychic happened to imagine at the time. And so on.

There's little or no follow-up to the psychics' information and predictions. We are shown what the client is told at the time but not afterward. We see carefully edited clips from psychic readings, but there is no effort at all to reveal, much less investigate, whether any of it is true or not. Audiences need a before and after—something objective to compare information and predictions to—otherwise it's just anecdote.

Psychic Lives

Several of the mediums talk candidly about their own personal struggles with anxiety, depression, sexual identity, and

so on. This is admirable and nothing to be ashamed of; most people struggle with such issues at some point in their lives. But as the film makes clear, these mediums are often adopting the informal role of psychotherapists. Licensed psychologists and counselors have spent years getting formal, validated training and studying different approaches, models, and techniques. They are trained—and ethically obligated—to keep their own emotional states, personal lives, and situations out of the therapy session. Psychics are under no such constraints, and in fact several talk openly about how their work helps heal themselves. Psychics—like life coaches and others in similar informal therapy roles—have no training or framework for what's appropriate or ethical. It's important to remember that the clients of psychics, for the most part, are a self-selected group of people who are grieving, troubled, or in some emotional distress. While for some it's party entertainment, in many cases they have lost a loved one and are seeking information and reassurances from beyond the grave. Furthermore, it is unethical to speak on behalf of the dead; these are (or were) real people whose unique, authentic voices and lived experiences should be respected and honored. Reading a book by a deceased person or watching a recording of them is one thing. But having a paid stranger pretend or presume to reveal their memories, thoughts, and experiences—however banal and sincerely conveyed—is insulting. Lost loved ones deserve better.

The film also sheds light on how it is that people come to believe they have psychic powers. The basic foundational and psychological aspects have been studied for decades, including confirmation bias (remembering the hits and forgetting the misses), innumeracy about probability (attributing some special significance to a rare but random event), and so on. (For more on techniques used by psychic mediums, see, for example, Nyman et al. 1999, Edward 2012, Radford 2017, and French and Stone 2014.) But while everyone experiences those to some degree, not everyone comes to believe they are indeed psychic. Even if someone thinks they have some special, personal ability, taking money from clients to do it is a different level. There are rafts of books in the New Age and self-help sections promising to help you develop your psychic ability, along with seminars, online courses, and so on. One psychic seen in the film did just that: he took a class on developing psychic powers and, sure enough, concluded that he was indeed psychic!

Of course, because the field is unregulated—and psychic ability has never been proven to exist—there's no way to know whether the course was successful (the downloaded and framed certificate on the office wall notwithstanding). Contrast this with virtually any other profession, from mechanic to doctor to electrician to airline pilot, which assures that people who earn money getting paid to provide a service at least have basic competency in their field. And, of course, they can objectively demonstrate that ability in empirical testing and on demand; either they can fix a transmission, correctly diagnose a disease, or land a plane—or they can't. To do their jobs, they rely on formal education (confirmed by standardized testing) and rigorous training in best practices, resulting in licensures and certificates. They do not rely on impressions, feelings, and ideas that come into their head and may be coming from either dead people *or* simply their imagination.

One of the psychics in the film uses the familiar trick of moving goalposts by expanding the pool of subjects (and thus potential hits). When he makes a comment about his client that is clearly wrong and that the client doesn't validate, suddenly the *documentary filming crew* is included in the reading! It's not clear how many people were in the room (probably at least five, including the cameraperson, audio tech, at least one producer, etc.). And because the powers are apparently so imprecise and uncontrollable that the psychic himself doesn't even know where the information is coming from or directed to, how do we know what to make of it?

We're told by the pet psychic that she can get information from great distances and other parts of the city—perhaps even other parts of the state or in neighboring states. If that's true, presumably the psychic could be getting information from people outside the room; maybe it applies to someone in a neighboring apartment. If so, the pool expands exponentially, from one person—the paying client who's asking for information specific to them—to dozens or hundreds of other unrelated people. Probability suggests that with a large enough number of people, and enough vague information, an accurate piece of information is virtually guaranteed. Where do we draw the line? When does Occam's razor come into play? At what point does a reading become testable? The filmmakers carefully avoid asking anyone who might have an informed opinion on such matters, such as Chris French, Richard Wiseman, Jim Alcock, Jim Underdown, Susan Gerbic, or me—or other psychologists, philosophers, ethicists, or skeptics.

While this technique artificially inflates the psychic's seeming success, it also does a disservice to the client who is paying (and trusting) them. A person

comes to them seeking true—and often deeply personal—insights and information about their lives and loved ones. To have a psychic give you flat-out wrong information and then backpedal by saying, "Oh, sorry, that loving and personal message from your mother a minute ago was actually *not* from your mom; that was a stranger, and it was intended for the production assistant you met briefly twenty minutes ago who's now in the corner eating Doritos and scrolling Instagram" is shady and dishonest. How can any of this be reliable?

Perhaps most frustratingly, the film ignores obvious opportunities to actually test some of the psychics' claims. While many pieces of information and predictions are inherently too vague to be falsifiable, objective forensic science could be brought to bear on many claims. Everyone involved in the film seems unaware of (or indifferent to) the fact that psychic powers such as those demonstrated by these mediums can be, and have been, scientifically tested. For decades. And the tests have always come up short.

There are many simple ways to test psychic powers. For those who claim the ability to perform psychometry, it would be a simple matter to get a personal object and ask several different psychics to independently describe the person it belongs to; either the readings will match the true owner (and, presumably, each other) or they won't. For those who claim to communicate with animals, simply let a pet play for a while with a specific, identifiable object (say, a bright blue squeaky toy) and then take the animal into an adjacent room and have several psychics ask the pet what toy it played with just moments ago. Answers to questions that a person might have about their parents or ancestry could be answered by psychics brought into the case cold and then compared with genealogical research. And so on. If psychics truly want to test their abilities, there are numerous ways to do so, and many people who are happy to assist—me included.

I expect that the filmmaker's reply would be that she is neither equipped to, nor interested in, putting the psychics to the test; that it's all well and good if others want to do it, but her role is making a film—and it's unfair to criticize the film for not being something it was never intended to be. The topic of the film is a handful of psychics and their clients in New York City—not whether their powers are real. This is a legitimate defense. A documentary film necessarily must focus on only a few narrow aspects of a person or incident, and just because others would have liked to see a different, or broader, approach doesn't mean that the film is flawed or misleading.

Psychics and Bullshit

Wilson's agnostic approach to the veracity of psychic powers in *Look into My Eyes* is a wise choice from a filmmaking point of view; if you open that door, then you're obligating yourself to tackling, or at least addressing, a whole world of psi research, skepticism, and other discussions. Avoiding a skeptical approach likely helped secure the cooperation of the subjects; psychics often claim to welcome skepticism and scrutiny—and indeed at times unironically offer tips on how to avoid being scammed by "fake psychics"—but are comfortable with only softball questions and get defensive when challenged or asked to explain their failures.

But avoiding asking "But is this true?" comes at a cost. Indifference to truth is unfortunately in vogue these days. In recent years, the information ecosystem has become increasingly contaminated with misinformation, disinformation, rumor, conspiracy theories, AI-generated deepfakes, speculation presented as fact, and so on. When people are confronted with evidence that what they're saying is false—or at least unsupported—the typical fallback is that it doesn't matter whether it's true in particulars; instead, the larger message is what people should take from it: Your grandma loves you, even if my vivid and specific vision of a special hummingbird pendant she gave you turned out to be my imagination. When politicians said that immigrants are eating dogs and cats, it was not true, but that's irrelevant because it served its intended purpose: to raise anti-immigrant fear and disgust. It *resonated* with the intended audience, and that's what matters.

If the audience achieving the desired emotional state is the crucial metric for success of a message—as *Look into My Eyes* implicitly asserts—then whether it's true or not is indeed irrelevant. Harry Frankfurt, in his seminal essay *On Bullshit*—later expanded into the 2005 best-selling Princeton University Press book (see our September/October 2023 issue)—notes:

> It is impossible for someone to lie unless he thinks he knows the truth … The bullshitter, however … is neither on the side of the true nor on the side of the false. His eye is not on the facts at all, as the eyes of the honest man and of the liar are, except insofar as they may be pertinent to his interest in getting away with what he says. He does not care whether the things he says describe reality correctly. He just picks them out, or makes them up, to suit his purpose.

To be clear: I think that the psychics in the film—like most psychics I have met and investigated over the past thirty years—are sincere. I'm sure they would bristle at being called bullshitters, but the simple fact is that they fit the description. Until they take a principled stand for truth and seek information that challenges their beliefs, I don't know what else to call them. At the end of the day, it's not surprising that the average person with no background in critical thinking, skepticism, or psychology would be impressed with the psychics as they are depicted in *Look into My Eyes.* It's only when you start asking simple, fundamental—and perfectly reasonable—questions that the cracks appear. ■

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Teaching Critical Thinking: An Introduction to the Special Section

DAVID MCRANEY

I recently enjoyed the great honor of taking the stage at CSICon 2024 in Las Vegas, where I gave a lecture about how people do (and do not) change their minds and offered advice on how (and how not) to change them. I met Neil DeGrasse Tyson and Brian Cox, stole some candy from the booth operated by Skeptical Inquirer, and briefly played piano in the lounge down the hall from the exhibits and the conference swag as skeptics from around the country (and even a few other countries) milled about waiting for the hotel elevators to come back online. It was the best.

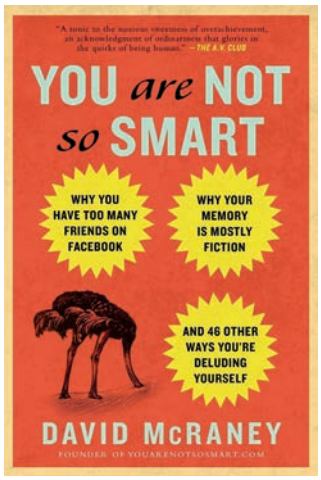
Actually taking the stage and drinking cocktails with this incredible collection of human beings, each one a Carl Sagan–inspired candle in the dark, all committed to science and media literacy, was in many ways the culmination of a series of adventures in skepticism that for me began back when I first encountered the outreach of a vanguard of advocates for critical thinking, including James Randi, Penn and Teller, Darren Brown, and Phil Plait.

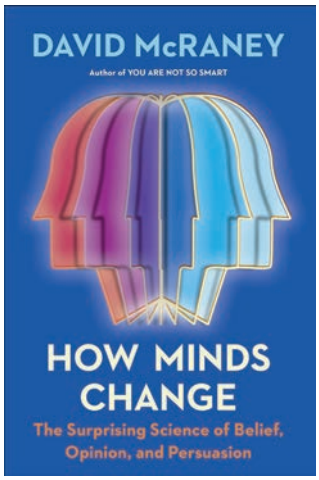
So, getting a chance to spend time with all the people who are now carrying the torch for the skeptics movement was an enormous moment for me. When I was a boy, the efforts of this group of humans—people who regularly gather to trade insights on how to not only get better at being wrong but help others do the same—made it all the way to the deepest of the Deep South where I was growing up. Like many of the others I met at CSICon who grew up in similar places, that outreach changed my life. The efforts of this group set me on a path to learn more, think more, and understand more about why we think, feel, believe, and do all the weird things we do, believe, feel, and think.

Therefore, it was an even grander honor to be asked to introduce this special section about critical thinking in this issue of SI devoted to the new vanguard of science communicators whose content is today—right now—making its way into the lives of people eager to find the others.

It is with immense gratitude that I direct your attention to the essays just beyond this introduction, all written by the modern torchbearers of critical thinking outreach, all heroes on the frontlines of thinking about thinking in this, perhaps our most epistemologically chaotic era, a time when the information ecosystem in which we live, work, and play will require more from the coming generations than just a side-eye at claims of the paranormal and sightings of unidentified flying objects.

To navigate the constant barrage of possibly fake news, the anti-science death rattle of contrarian aging politicians, and the coming avalanche of AI-generated content, we will need to continuously update our critical thinking toolkits and pass them along to the uninitiated. In the pages that follow, you will find guides to do just that at every age.


YOU are NOT so SMART
WHY YOU HAVE TOO MANY FRIENDS ON FACEBOOK
WHY YOUR MEMORY IS MOSTLY FICTION
AND 46 OTHER WAYS YOU'RE DELUDING YOURSELF
DAVID McRANEY



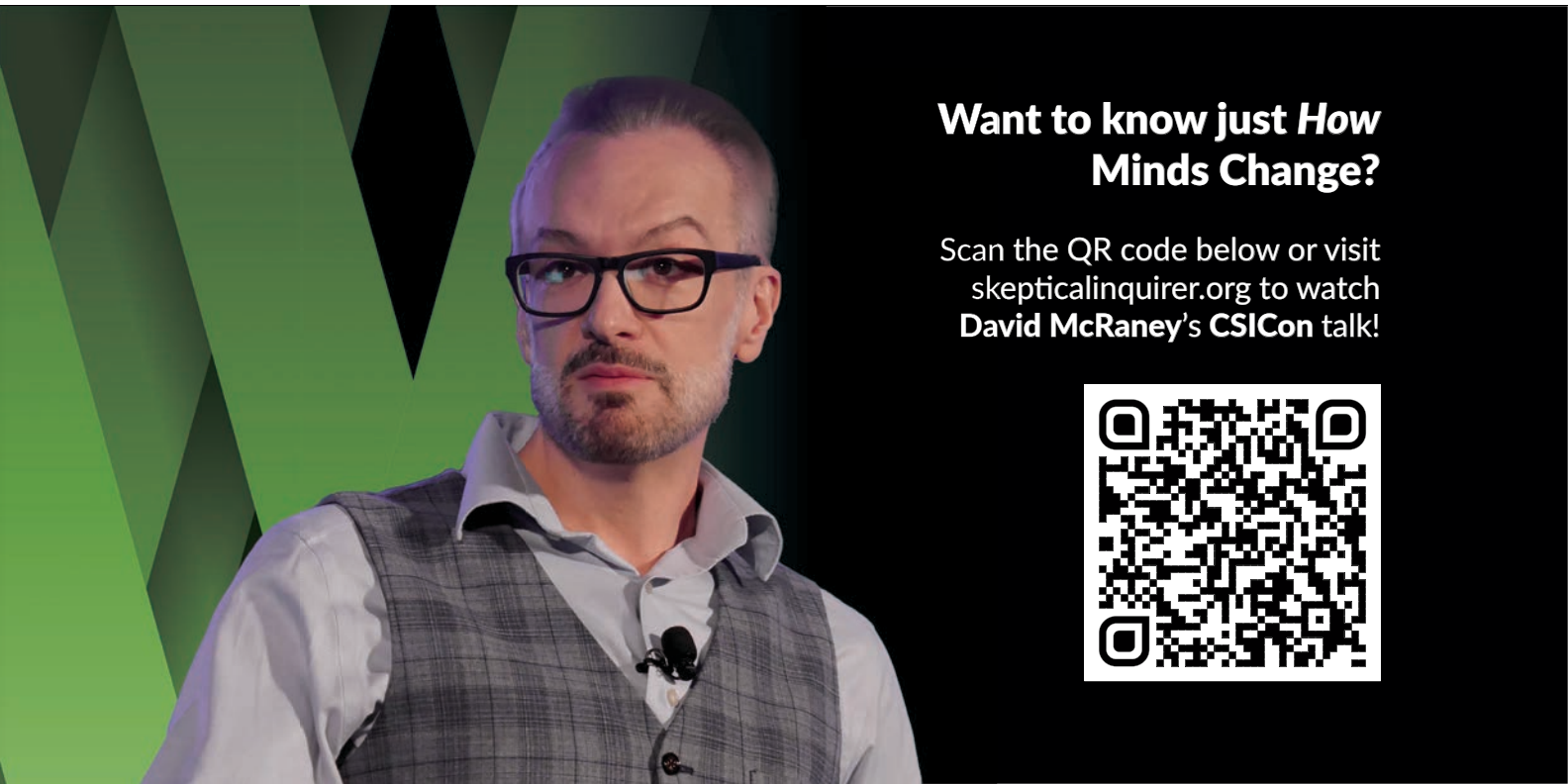
The incredible Stephanie Simoes of Critikid will show you how "mind illusions" in the style of optical illusions are a great way to introduce critical thinking to children. Steve Trash of PBS TV will share a new series of videos designed to teach kids critical thinking essentials in a style and presentation designed to keep their attention amid all the noise online. Timothy J. Redmond, an inspiring high school teacher, shares the syllabus for his course on critical thinking, which includes everything from how to approach astrology to how to write a paper on the chupacabra. William Matthew London of *Consumer Health Digest* on Quackwatch offers insights on how to pass along numerical hygiene and other numeracy skills to emerging adults so they can better approach dirty data with clean minds. And Bertha Vazquez of Generation Skeptics, along with Melanie Trecek-King of Thinking Is Power, will share highlights from their critical thinking lessons and courses, free and ready to be adopted by parents, libraries, museums, and workplaces.

While you read these wonderful pieces, I will continue my own outreach through The Alliance for Decision Education and The School of Thought, the *You Are Not So Smart* podcast, my upcoming books, and continued collaborations with the many torchbearers of this movement such as *Modern Rogue* and *Be Smart* (both YouTube channels), as well as contributors to this issue, such as Critikid and Thinking is Power.

It was the approachable, entertaining, challenging work of the previous generation of critical thinking advocates and educators that led me to become a science journalist. I owe everything to the pre-internet skeptics who made the sort of content that made its way to my trailer in the woods. And like everyone else who made their way to this community thanks to the efforts of the early debunkers and charlatan exposers, science communicators, and paranormal investigator investigators, I'll keep sharing issues of this magazine, pointing people to the projects of the authors featured here, and inviting people to come to the gathering of skeptics both online and off.

Because as long as people are still thinking, we must encourage people to keep thinking *about* thinking, and SI is the longest running magazine devoted to that sort of intellectual humility, meta-introspection, and skeptical inquiry. Plus, they have great taste in individually wrapped candies. ■

David McRaney is a science journalist and lecturer who created the blog, internationally best-selling book, and ongoing podcast *You Are Not So Smart*. His most recent book, *How Minds Change*, is all about the nuances of communication and persuasion as well as the science behind how and why we do (and do not) update our understanding of the world (and ourselves) when faced with novel experiences, ambiguous information, challenging conversations, or a combination of all three.


Want to know just *How* Minds Change?
Scan the QR code below or visit skepticalinquirer.org to watch **David McRaney**'s **CSICon** talk!

Critikid: Critical Thinking and Mind Illusions for Kids

Puzzles with counterintuitive solutions teach us to be wary of intuitive judgments and can help us make the best decisions.

STEPHANIE SIMOES

Optical illusions, such as the famous Müller-Lyer illusion depicting two lines of equal length (shown at the top of the Critikid logo box to the right), teach us that we cannot always trust our immediate interpretations of what we see. They show us that we must use slow, careful analysis, and sometimes even measuring tools, to make accurate judgments.

Puzzles with counterintuitive solutions, or "mind illusions" as I like to call them, help demonstrate that the same is true about what we think. To make accurate judgments, we can't always rely on our intuition; we need to think about things slowly and carefully and perhaps even run tests in the world.

I run social media accounts to promote critical thinking, and I often post mind illusions to demonstrate that our intuition can be misleading. The puzzles that seem to show this most effectively (judging effectiveness by the amount of pushback I receive) are puzzles that require the use of Bayesian inference.

Bayesian Inference and the Peculiar Library

Thomas Bayes's theorem of probability shows us how to judge the probability of something when we receive new information about it. Bayesian inference requires updating our probability judgments when we acquire new information. You don't need to know the formula for Bayes's theorem to grasp the idea; a few thought experiments can familiarize you with the concept.

Imagine you have an opaque bag containing one red marble and one blue marble. The odds of drawing a red marble are, of course, 50 percent. You close your eyes, withdraw one marble, and put it behind your back without looking at it. What are the odds that the marble remaining in the bag is red? Still 50 percent. But what if you look behind your back and see that the marble you previously withdrew is blue? The probability that the marble in the bag is red suddenly becomes 100 percent. Nothing about the marble inside the bag changed, but the information you had did, so your probability judgment updates accordingly.

The key to understanding Bayesian inference is that new information changes probability judgments *even if nothing else changes*.

As a children's educator, I am always looking for ways to explain complex ideas to children. Here's a story I wrote (similar in structure to the marble one) that makes this idea accessible to children:

> You walk into a most peculiar library. This library has only two kinds of books: half are science fiction novels and half are romance novels. The books are not organized in any way whatsoever; they are randomly scattered throughout the shelves. The most curious thing of all is that the librarian makes everyone put on a blindfold before they enter! Wearing your blindfold, you stumble through the library and blindly take a book off a shelf. What are the odds that you've chosen a science fiction novel? (The child will likely say fifty percent.) You feel a tap on your shoulder and hear your friend's voice. "Psst," your friend whispers. "I snuck in without a blindfold!" Before you can ask how your friend got past the librarian, he continues, "Wow, that book you're holding has a cool spaceship on the cover!" Now, what are the odds you've chosen a science fiction novel? (Your child will likely remark that it is much higher.) The book didn't change, though. You are still holding the same book as you were before. So how could the odds change if the book you're holding didn't? [The child may figure out that the information is the key.]

These examples of Bayesian inference are very straightforward and don't get much pushback, but more complex ones—such as the Monty Hall Problem—often do.

The Monty Hall Problem

Imagine you are on a game show. You have to choose between one of three doors. Behind one of them is a new car; behind the other two are goats. You will win whatever is behind the door you choose. You choose a door hoping to get the car, but the game show host opens *another* door—one that he knows has a goat behind it. Then, the host gives you the option to switch your choice. What should you do? Should you keep

the door you initially chose? Should you switch? Or does it make no difference?

The intuitive answer for many people—especially those unfamiliar with Bayes's theorem—is that it makes no difference. It was my answer when I first came across this problem, too. After all, once the first door is opened, there are only two doors left, so it seems as though the odds should be 50/50.

The truth, however, is that it is very much in your best interest to switch. If you switch, you have a 2/3 chance of winning the car; if you do not, you have a 1/3 chance. If you don't believe me, try it out with a partner and three cards, or use an online Monty Hall Problem simulator. If you run enough trials, you will see that you win about 2/3 of the time if you switch and only about 1/3 of the time if you don't.

You can introduce children to this problem with the Candy Cup Game. Get three opaque cups and a bunch of little candies. Without them watching, put a candy under one of the cups. Run through the scenario like the Monty Hall problem: Ask your child to choose a cup, lift a cup that *doesn't* have the candy, and ask your child if they want to switch. Repeat this many times and have a piece of paper nearby to keep tabs. How many times do they win the candy when they switch? How many times when they don't? Make sure to test both scenarios numerous times.

Your child will see that it's better to switch. This game is a valuable educational tool not only because it introduces children to Bayes's theorem in a fun and accessible way but also because it demonstrates the importance of running a large number of trials when evaluating an event's probability.

Although the online simulators and Candy Cup Game may prove that switching is in your best interest, that doesn't make the answer any less counterintuitive. How can we make it make sense? The way I was able to grasp this problem was to imagine the scenario with 100 doors instead of three.

You are on a game show. You have to choose between one of 100 doors. Behind one of them is a new car; behind the other ninety-nine are goats. You will get whatever is behind the door you choose. You choose a door, but the game show host opens ninety-eight other doors—doors that he *knows* have goats behind them. Now, only two closed doors remain. The host gives you the option to switch. What should you do? Should you keep the door you chose? Should you switch? Or does it make no difference?

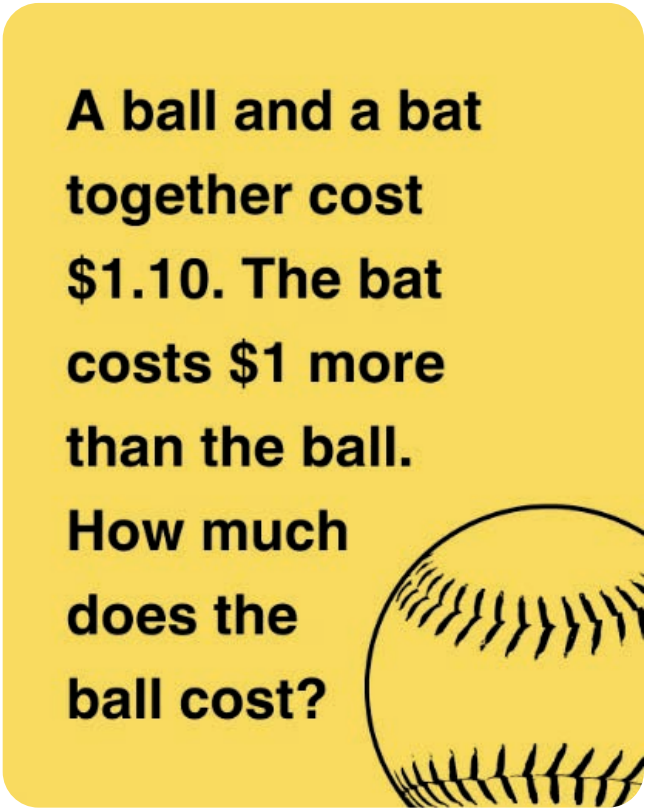
Now, it is clearer that you should switch. When you first chose a door, you had only a 1/100 chance of choosing the winning one. The probability that the other closed door has the car is 99/100.

I was not the first to receive much resistance when stating the answer to the Monty Hall Problem. Marilyn vos Savant, who had the highest IQ recorded in the *Guinness Book of World Records* from 1985 to 1989, posted the problem and its solution in her column Ask Marilyn in *Parade* magazine in 1990. In response, vos Savant received, by her estimates, around 10,000 letters from readers saying she was wrong (Tierney 1991).

Even highly intelligent adults who have a lot of time to think about this puzzle struggle with it. This is why the Monty Hall Problem, and puzzles like it, effectively show how much our intuition can lead us astray.

The Bat and Ball Puzzle

When I say *intuition*, I'm referring to our fast, automatic thinking, or what Daniel Kahneman refers to as "System 1" thinking in *Thinking Fast and Slow* (Kahneman 2011). This is contrasted with our slower, more deliberate thinking, which Kahneman calls "System 2" thinking. System 1 is fast but not



always very accurate. System 2 is more likely to bring us to the correct answer, but it works slowly.

The classic Bat and Ball puzzle provides a simple demonstration. Try to answer this question as quickly as possible: A bat and a ball together cost $1.10. The bat costs $1 more than the ball. How much does the ball cost? Quick! What's the answer? Now, take your time and consider it slowly. For many people, the intuitive answer (i.e., ten cents) is different than the correct one (i.e., five cents).

I do not share puzzles with counterintuitive solutions with the aim of saying that our intuition is useless or to suggest we should not listen to it. There is a good evolutionary reason for having the capacity to think fast, even at the cost of accuracy. If you walk into a room and see something snake-like, your intuition will kick in and tell you to jump back. If the figure turns out to be a rope, you are wrong but safe. That's better than being correct but poisoned from a bite you received during a slow, careful analysis of the shape. In urgent scenarios, speed is usually more important than accuracy.

While our intuition has its purpose, it becomes troublesome when we cling to its judgments even when we have time to slowly and rationally think about something. In the Bat and Ball puzzle, our rational answer can easily override our intuitive judgment. There are times, however, when it's hard to look past our intuitive answer. The Monty Hall Problem is one such example. Our intuitive judgments, therefore, are not just the ones we reach quickly but also those that *feel* right.

Mind Illusions in Daily Life

Encountering mind illusions in puzzle form helps us identify such illusions when we come across them in day-to-day life.

I do boxing, and I'm not very good at it. Messing up the punching sequences (jab, cross, hook, etc.) is my ordinary state. Sometimes, I perform particularly well, and the coach says, "Good job!" After that, I seem to make mistakes. I previously assumed that his praise made me feel too much pressure to perform well and that this was causing me to do worse the following time. However, I now realize this assumption was probably a mind illusion. It is much more likely that my failure after praise is a case of "regression to the mean." This is the principle that extreme outcomes are usually followed by more typical ones. Exceptionally good or poor performance is likely to be followed by something closer to an average performance—and my typical performance in boxing involves many mistakes.

Another time we might encounter mind illusions is when assessing risk. For example, a guide put out by the U.S. Food and Drug Administration (2011) made the case that risk assessment can depend on how information is presented. In one example, some participants were told that "ten patients out of 100" experienced a specific medication side effect while other participants were told that "10% of patients" experienced the same side effect. Some participants perceived the medication as riskier when placed in terms of frequency as compared to a percentage. "Ten percent" and "ten in a hundred" have the same meaning. But, just as shapes at the ends of lines can make two equivalent lines look like they are different lengths, the way data is presented can lead to different intuitive interpretations.

Knowing about the existence of optical illusions makes them easier to catch. We have seen so many of them that we all know we can't trust our immediate judgments of what we see. We should be equally aware that we can't always trust what feels right to our minds. Just as we need careful thought (and perhaps even a ruler) to analyze the relative lengths of lines correctly, we need slow, deliberate thinking to navigate the world of mind illusions while minimizing our chances of being fooled. ■

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Stephanie Simoes is the founder of Critikid.com, a platform dedicated to teaching critical thinking to kids and teens. She creates interactive courses on logic, communication, media literacy, and data analysis. She also shares critical thinking content for adults on social media (@critikid).

Media Masters Rock: Critical Thinking about Social Media for Kids

A new campaign helps kids weed through the enormous volume of misinformation, disinformation, and general silliness on the internet.

STEVE TRASH

Having attended my first CSICon this past October, I came home fired up about the ways that everyone was using their talents to help make the world a little better. Specifically, the presenters were helping us all become better critical thinkers. I thought maybe I should use my own talents to help promote critical thinking in kids, especially when it comes to social media. Could I create some kind of social media user guide that might be helpful? What would the key tenets need to be? What are *the* most important ideas kids need to know, and how can I make these ideas easy to understand? I didn't know the answer to any of these questions.

So, I asked a few experts. Melanie Trecek-King and I had worked together on a "What Is Science?" episode for my PBS *Steve Trash Science* TV show. I asked her, "What are the three or four most important critical thinking/digital literacy ideas kids *must* know?" We talked for a long time. I then asked the same question of Tanya Ott, professor at Mercer University's Center for Collaborative Journalism in Macon, Georgia. We talked for a long time, too.

I took their answers and did a little more digging of my own to break the complex ideas down to "bumper sticker" concepts that might be sticky with kids. I brainstormed, refined, wrote, edited, rewrote, rewrote some more, and then produced and began creating a campaign: Media Masters Rock.

The primary thing I've learned after forty years of sharing science, eco-information, and entertainment with kids is that they don't like someone wagging a finger at them and saying, "You should do this." So, I thought, what would make kids

want to voluntarily follow the guidelines? I came up with a superhero theme with the main idea that a Media Master is someone who thinks first before posting, commenting, or sharing. A Media Master is also someone who takes responsibility for their actions online and offline. Here are the rules I developed:

- The Rubber Band Rule: Everything on social media can snap back on you. Be careful what you do out there.
- The AQBS Rule: Ask Questions. Be Skeptical. See something on social media? Is your response a strong emotion? If yes, pause first, ask questions, and be skeptical.
- Ask Who Is Getting the Candy? On social media, *candy* is money, fame, or popularity. Thinking about who is benefiting from that post helps us understand more about the poster and their intentions.
- Ask How *Full* Is It? Before you post, comment, or share, ask yourself some questions: Is it *helpful*? Is it *hurtful*? Is it *truthful*?

I refined and rewrote the core concepts over several months, but I liked the final four, so I wrote, shot, edited, produced, and released four short educational videos for the campaign. Once the videos were done, my team created downloadable and printable posters for the classroom. We also created related grade-specific study guides for teachers.

I've learned from my live shows that there is almost nothing as sticky as music. It hits on a gut level. If you have the right music or song, kids will almost involuntarily engage. My buddy Anthony Brooks is a beatboxer; he creates music with his lips, tongue, mouth, hands, and chest. He's really good. So I called him up and asked him to watch four short videos and create four short beatbox songs with the same themes. And could he make each song wildly different, something along the lines of songs from the *School House Rock* series from the 1970s?

And he did! One song is rap/hip-hop and another is R&B/gospel. He also wrote one that sounds like The Temptations or Smokey Robinson and yet another that sounds like it's straight out of the film *O Brother, Where Art Thou?* As a bonus, he created a Media Masters Rock dance; it's called the "Snaps Back Dance."

I've put all the campaign materials in one place for teachers to access. I've made everything Creative Commons licensed, so people everywhere can use them freely. The campaign materials right now include four short educational videos, five songs, five downloadable posters, activity guides for each song, and study guides for each video. To find them all, visit: https://www.stevetrash.com/media-masters-rock/.

Feel free to share them with your network of friends, teachers, and kids. I've tried to use my talents to bring a little light to the dark world of twenty-first century digital media for kids. We'll just have to wait and see if any of it sticks. ■

Steve Trash is a professional magician, eco-entertainer, and star of the PBS TV show ***Steve Trash Science***. The show can be found on the National PBS site at https://www.pbs.org/show/steve-trash-science/.

Highly Effective Thinkers: Critical Thinking for Teens

This high school course teaches students to be simultaneously curious, diligent, skeptical, humble, argumentative, courageous, and compassionate.

TIMOTHY J. REDMOND

In winter 1991–1992, I went to the theater to see Oliver Stone's blockbuster film *JFK*. As a cynical (as opposed to skeptical) eighteen-year-old college freshman, the movie convinced me that John F. Kennedy had been assassinated by a cabal of gunmen who opposed the young president's alleged plan to withdraw the U.S. military from Vietnam. Soon thereafter, I sought out books (such as David Lifton's *Best Evidence*) and documentaries (including *The Men Who Killed Kennedy*) that similarly challenged the government's conclusion that Lee Harvey Oswald—and Oswald alone—had killed the president.

However, several years later, I happened upon *The Kennedy Assassination: Beyond Conspiracy*, an ABC News documentary that provided ample evidence that Oswald was indeed the lone shooter. I went on to read Richard Posner's *Case Closed* and Vincent Bugliosi's tome *Reclaiming History* and learned that conspiracy theorists had been terribly wrong about important details involving the assassination. It was, to say the least, an epistemological epiphany.

My journey into and out of the JFK assassination conspiracy theory rabbit hole ignited my interest in critical thinking. I set out to learn as much as I could about cognitive biases, logic, and media and scientific literacy. And I often wondered whether I would have succumbed to all the conspiratorial claptrap had I been exposed to the precepts of critical thinking in high school.

Today, I am a secondary social studies teacher at a suburban high school in Western New York. As such, I am in a position to instruct my students on how to avoid the pitfalls of poor thinking that plagued me when I was their age. Accordingly, I submitted a proposal for a half-year critical thinking course to my district's curriculum council in 2018. The plan was approved the following year and added to the course catalogue in 2020. Since then, teaching the elective—which is open to sophomores, juniors, and seniors—has been one of the most enjoyable and impactful experiences of my career.

The course—which is organized into seven units of study (Figure 1)—begins with some chicanery. Inspired by the work of Bertram Forer and Melanie Trecek-King, I provide each student with an astrology-based personality assessment and ask them to gauge its reliability. After the students assess the profile as "accurate" or "highly accurate"—as they are wont to do—I reveal that they all received the same report and thus succumbed to the Barnum effect, the tendency to accept personality descriptions as if they apply to us even though they are overly vague (Trecek-King 2022).

Figure 1: Units of Study

Unit 1: The Importance of Critical Thinking
Unit 2: Cognitive Biases
Unit 3: Media Literacy
Unit 4: Scientific Literacy
Unit 5: Numeracy
Unit 6: Arguments and Logic
Unit 7: Psychics, the Paranormal, the Satanic Panic, Conspiracy Theories, Cults, and Cryptids

Then we read a pair of stories relayed by David Robert Grimes (2021) in *Good Thinking: Why Flawed Logic Puts Us All at Risk and How Critical Thinking Can Save the World*. The accounts—which describe how China's Great Sparrow campaign induced a famine in the late 1950s, and the Soviet Union's Stanislav Petrov saved the world from nuclear disaster in 1983—illustrate the costs and benefits of bad and good thinking, respectively. In short, Unit 1 suggests that we're all susceptible to cognitive lapses and that these mental mishaps can have deleterious consequences. Because critical thinking is our best possible defense against such errors, it is imperative we develop the disposition and skills necessary for skeptical inquiry. Units 2–7 are designed to do just that.

Unit 2 begins with an exploration of what I call the seven habits of highly effective thinkers. In short, critical thinkers should cultivate a curious, diligent, skeptical, humble, fair-minded, courageous, and compassionate turn of mind (Figure 2). Then, we read an excerpt from Guy Harrison's book *Think* that spotlights the role that proper nutrition, sleep, and exercise play in our ability to cogitate effectively (Harrison 2013). Next, we spend several weeks examining fifty common cognitive biases that can compromise our thinking (Figure 3). After I define the bias, we explore its manifestation in the lab as well as in the real world. Afterward, we discuss why the

Figure 2: The Seven Habits of Highly Effective Thinkers

Be Curious
As Socrates is alleged to have said, "The unexamined life is not worth living." Ask yourself and others questions … a lot of questions: How does this work? Why do human beings do that? Why do I believe this? How do I know that?

Be Diligent
Asking questions is laborious. We may have evolved to be cognitive misers, but the failure to think critically can get us into trouble. While it might be easier to just hurry up and feel, it is often imperative that we stop and think.

Be Skeptical
Don't be naive and believe a claim in the absence of evidence. But don't be cynical and dismiss a claim in the presence of evidence either. Indeed, just because you're being critical doesn't mean you're critically thinking. Instead, be skeptical. Or, as David Hume argued, "proportion [your] beliefs to the evidence."

Be Humble
Be willing to say: "I don't know," "I don't have enough information to have an opinion on that issue," "I was wrong," and "I changed my mind." Remember, as the American physicist Richard Feynman said, "The first principle is that you must not fool yourself, and you are the easiest person to fool." If you think you have arrived as a critical thinker, you aren't thinking critically.

Be Argumentative but Fair-Minded
We should seek out arguments. An argument is not a shouting match but rather an exchange of reasons for and against a proposition. When doing so, however, it is imperative that we be fair-minded and adhere to Andy Norman's grand commandment, "Thou shalt yield to the better reason."

Be Courageous
As Leo Tolstoy notes, "Free thinkers are those who are willing to use their minds … without fearing to understand things that clash with their own … beliefs." It is not easy to follow the evidence when that evidence leads you to a position at odds with your colleagues, peers, friends, or family. Yes, critical thinking exacts a cognitive toll. But it can exact a social cost as well. Accordingly, a critical thinker must also be a courageous thinker.

Be Compassionate
We must be compassionate. Like Baruch Spinoza, we should make "a ceaseless effort not to ridicule, not to bewail, not to scorn human actions, but to understand them." Thus, we should be compassionate to those who lack a background in critical thinking. It is insolent and ineffective to browbeat someone for succumbing to this cognitive bias or that logical fallacy, etc. Yet we should also extend compassion to ourselves, for we too will periodically fail to live up to the demands of critical thinking. When we do, we should acknowledge our error and welcome it for what it is: an opportunity to move closer to the truth.

bias is problematic and how it can be overcome. For example, consider the selective exposure bias—or our tendency to search for information that supports our point of view. First, we discuss Charles Taylor and Milton Lodge's seminal study that found that Democrats and Republicans opted to read arguments about gun control and affirmative action from like-minded sources 75 percent of the time (Lodge and Taber 2006). Second, we examine how selective exposure influences everything from the cable news programs we watch and the people we follow on social media to the books we buy and the company we keep (Brockman and Kalla 2024; Cinelli et al. 2021; Stockton 2017; Struyk 2017). Third, we explore how the bias can engender poor decision-making, polarized policy views, and partisan hatred. Finally, we discuss how we can expose ourselves to opposing but fair-minded points of view and why that exposure tends to result in more informed decisions, depolarized issue opinions, and greater cross-party understanding (Coleman 2021; Sunstein 2009; Bail 2021).

As part of Unit 2, students are required to recreate one well-known meme by adding text exemplifying one of the cognitive biases (see Figure 4 for an example). The meme includes a definition of the bias as well as a brief description of how it applies to their meme.

Units 3 and 4 tackle the challenge of how to distinguish between good and bad sources of information. It is a vast and nuanced conversation that examines how expertise, codes of conduct, and research methods prepare and incentivize statisticians at the Federal Statistical Service System, journalists at major media outlets, and academics at various research institutions to produce content that is more likely to be accurate and unbiased than other sources of information (Rauch 2021). This includes a deep dive into a series of important concepts, such as epistemological trespassing; the Nobel Disease; the Galileo Syndrome; hypothesis testing; independent and dependent variables; randomized, double-blind, placebo-controlled studies; the placebo effect; regression analysis; correlation coefficients; extraneous variables; correlation versus causation; peer review; peer citation; predatory journals; impact factors; replication and the replication crisis; scholarly consensus; p-hacking; publication bias and the file drawer problem; preregistration; the retraction of studies; adversarial, structural, and partisan biases; the hostile media effect; the distinction between news content and editorial content; false balance; the editorial process; misinformation, disinformation, malinformation, and fake news; cheap fakes; deep fakes; the liar's dividend; reverse image searches; and more. The unit culminates with the introduction of the SIFT method, which—as described by Mike Caulfield and Sam Wineburg in their book *Verified: How to Think Straight, Get Duped Less, and Make Better Decisions about What to Believe Online*—encourages people to fact check information online by *reading laterally*. In other words, when people happen upon a claim on a website or their social media feed, they should immediately open another tab and investigate the source or author, seek corroboration from well-known reputable sources, and trace and substantiate any links that may have been provided.

Figure 3: Cognitive Biases and Heuristics

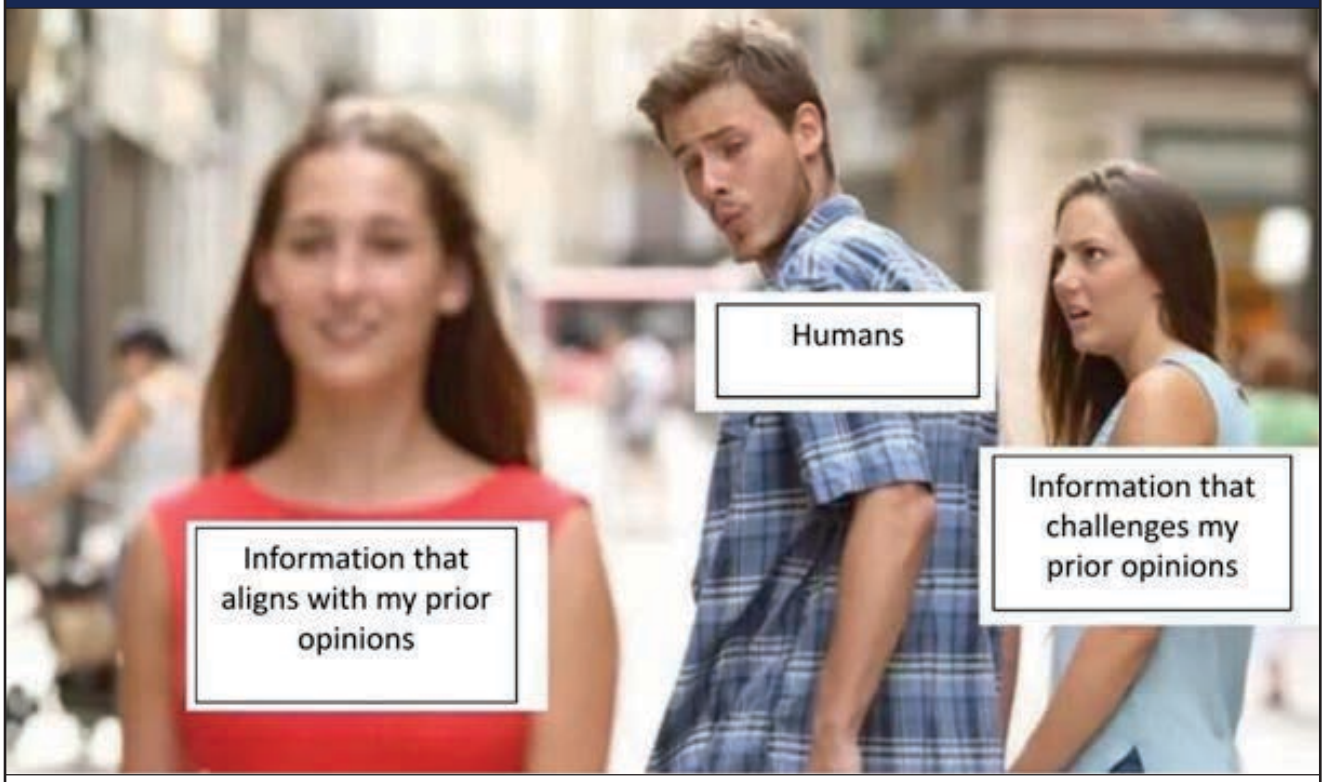
1. Bandwagon Bias
2. Cognitive Dissonance
3. Motivated Reasoning
4. Selective Exposure
5. Remember the Hits, Forget the Misses Bias
6. Survivor Bias
7. Correlation Implies Causation Bias
8. Illusion of Understanding
9. Dunning-Kruger Effect
10. False Balance Bias
11. Selective Perception
12. Expectation Bias
13. Pareidolia
14. Apophenia
15. Inattentional and Change Blindness
16. Confirmation Bias
17. Disconfirmation Bias
18. Barnum Effect
19. Illusory Truth Effect
20. Faulty Authority Bias
21. Halo and Horn Effect
22. Fundamental Attribution Error
23. In-Group Bias
24. Out-Group Bias
25. Out-Group Homogeneity Bias
26. Group Think
27. False Consensus Bias
28. Pluralistic Ignorance Bias
29. Just-World Bias
30. Omission Bias
31. Proportionality Bias
32. Foot in the Door Bias
33. Illusion of Control Bias
34. Narrative Bias
35. Rosy Retrospection Bias
36. Negativity Bias
37. Availability Bias
38. Anchoring Bias
39. Framing Bias
40. Sunk Cost Bias
41. Hindsight Bias
42. Clustering Illusion
43. Gambler's Fallacy
44. The Lottery Fallacy
45. Base Rate Neglect
46. Inverse Proportionality Bias
47. Memory Transience
48. Memory Suggestibility
49. Memory Misattribution
50. Blind Spot Bias

Unit 5 delves into the threat of innumeracy—the inability to understand, reason with, and apply simple numerical concepts. For example, we discuss the misleading use of the term *average*, dangling comparatives, the difference between absolute and relative change, the law of large numbers, and regression to the mean. We also explore the various ways in which graphs can be manipulated (i.e., truncated axes, misleading scales, and visuals that distort the data they're supposed to represent). Finally, students learn how to interpret and evaluate public opinion polls by asking themselves questions, including: Is the sample random and representative? What is the margin of error? What is the confidence interval and confidence level? Has the poll been corroborated by other independent polls? They also acquire the skills they need to assess whether or not a poll's results have been skewed by matters such as the self-selection bias and the way in which a poll's questions are worded or ordered (Redmond 2022).

For its part, Unit 6 explores the steps we can take to distinguish between good and bad arguments. First, we discuss how to identify conclusions, identify premises, and diagram arguments. Next, we call upon the many skills that were acquired in Units 2–5 to evaluate the truth of an argument's premises. For instance, if someone cites a study as evidence for a particular conclusion, we can ask ourselves about the study's author, sample size, whether it controlled for extraneous variables, if it was peer reviewed and published in a respected journal, or whether it was replicated. Finally, we learn how to assess whether or not an argument's premises logically support its conclusion. Here, we discuss deductive arguments and a handful of formal fallacies as well as inductive arguments and several informal fallacies (Figure 5). Then, we pay heed to Massimo Pigliucci's argument that informal "logical fallacies are not necessarily fallacious—not all the time and not under all circumstances" (Pigliucci 2023; Boudry et al. 2015). We also emphasize how people tend to mischaracterize a logical argument as illogical when its conclusion conflicts with their beliefs and an illogical argument as logical when its conclusion aligns with their beliefs (Redmond 2022). In closing, we spend a class period discussing the strategies and skills that can facilitate constructive arguments, such as establishing personal relationships with our partners and engaging in collaborative inquiry by focusing on *how* we know what we know (as opposed to *what* we know or *why* we know it).

The course culminates with a series of case studies in Unit 7. First, we examine psychic readings, psychic predictions, and psychic detectives. We discuss the techniques of cold reading and hot reading, evaluate the prognostications of several soothsayers (both past and present), watch Derren Brown's *The System*—a show in which the British mentalist seemingly has the inerrant ability to predict the winner of any

Figure 4: Meme Assignment (Example)



Cognitive Bias: Selective Exposure

Definition: Selective exposure is the tendency to seek sources of information that reinforce one's preexisting views.

Description: This meme exemplifies selective exposure because it depicts a person looking away from information that contradicts his prior point of view in favor of information that supports it.

Figure 5: Informal Logical Fallacies

1. *Ad hominem*
2. Appeal to Ridicule
3. Appeal to Emotion
4. *Ad populum*
5. Appeal to Tradition
6. Slippery Slope
7. Ultimate Cause Fallacy
8. Proximate Cause Fallacy
9. Moving the Goalposts
10. Red Herring
11. Strawman Fallacy
12. Nirvana Fallacy
13. Naturalistic Fallacy
14. Equivocation Fallacy
15. Either-Or Fallacy
16. Hasty Generalization Fallacy
17. Quote Mining
18. Cherry Picking
19. Nut Picking
20. Appeal to Anonymous Authority
21. Appeal to Faulty Authority
22. Faulty Analogy Fallacy
23. Double Standard Fallacy
24. Burden of Proof Fallacy
25. Kettle Logic Fallacy

Figure 6: Research Paper

Students are required to produce a three-page paper in which they investigate a concept we discussed in class, research a topic of their choice (selected from the list below), and discuss how the former can contribute to a belief in the latter.

1. Alien Abductions
2. Ancient Astronauts
3. Astrology/Horoscopes
4. Bermuda Triangle
5. Bible Code
6. Bigfoot
7. Cattle Mutilations
8. Chupacabra
9. Crop Circles
10. Crystal Healing
11. Cupping
12. Dowsing Rods
13. ESP
14. False Confessions (during interrogations)
15. Firewalking
16. Ghosts
17. Halloween Candy Panic
18. Haunted Houses
19. Homeopathy
20. Indian Rope Trick/Levitation
21. Magnetic Therapy
22. Numerology
23. Performance Enhancing Bracelets
24. Repressed Memory Therapy (Satanic Ritual Abuse)
25. Séances
26. The Clown Panic
27. Therapeutic Touch
28. Chemtrails
29. Psychic Surgery
30. Psychokinesis
31. Witchcraft (modern instances)

horserace—and read Benjamin Radford's article "The Psychic and the Serial Killer" (Radford 2010). Second, we explore the paranormal. For instance, we discuss the ideomotor effect—the psychological phenomenon in which people make subtle motions that are unconscious—and experience it firsthand by playing with magic pendulums and the "Gopher" (or the so-called "Amazing Golf Ball Finder"). Then we watch portions of Frontline's documentary *Prisoners of Silence* to learn about the ideomotor effect's influence on the facilitated communication movement (for more on this, see also Stuart Vyse's column in this issue on the *Telepathy Tapes* podcast). Next, we enter the world of psychokinesis and extrasensory perception, where I amuse my students by bending spoons and performing the Princess Changing Card trick. Most exciting of all, however, is when Kenny Biddle, the chief investigator for the Committee for Skeptical Inquiry, attends my class as a guest speaker and regales my students with tales of how he was able to debunk various ghost hunting gadgets and haunted houses.

Third, we examine the Satanic Panic. After reviewing the movement's origins, we listen to rock music that is alleged to have backward satanic messages and watch a clip from *60 Minutes* about the boardgame Dungeons & Dragons' supposed influence on recruiting adolescents into the occult. Fourth, we turn our attention to conspiracy theories. After discussing some of the emotional, psychological, personal, and social variables that might push someone into conspiratorial belief, we watch the documentary *Behind the Curve* about the flat-earth movement, take a deep dive into the Kennedy assassination, and explore the world of Holocaust denial. Then students read a short chapter about another conspiracy theory of their choice—ranging from Roswell to chemtrails to what happened on 9/11—selected from Brian Dunning's *Conspiracies Declassified: The Skeptoid Guide to the Truth behind the Theories* (Dunning 2018). We bring the unit to a close by studying the Jonestown and Heaven's Gate cults and cryptids such as the Loch Ness monster and the Yeti. And all along, we take time to identify and discuss how cognitive biases, logical fallacies, and a lack of media, scientific, and statistical literacy contribute to people's false beliefs.

This unit is undeniably interesting. But it's also exhilarating. It is thrilling to watch the students apply all they learned in real time, to watch them identify and puncture the pitfalls of poor thinking that are present in each case study, to watch them become critical thinkers, and to watch them experience *their* epistemological epiphany.

At the end of the fall 2023 semester, I asked my students to reflect on the course. The results were universally positive. For example, students stated: "This was a great course!"; "I have been able to examine my own thinking and be more aware of possible misinformation, which is especially useful in today's world"; "I really enjoyed seeing the application of the concepts we learned in class in the real world"; "I've been able to implement some of the strategies we learned about in class, such as lateral reading, to check information from online sources"; "This class has become more relevant to my daily life than I expected, and I can tell you it has led me to make better decisions already"; and "This class will prepare you to become an adult. This class is a skills class and is the class to take if you want to become a better thinker, and it is genuinely fun!" In addition, one student excitedly told me that while she was

on vacation in Florida during winter break, a woman tried to sell her a magic crystal. My student politely declined, walked away, and told her mother, "That's just the ideomotor effect." Another student told me, "I never thought like this before. I never knew I could think like this before!"

There are also some promising results from an anonymous survey I administered on the first and last days of class (not presented here). In short, the number of students who professed to believe in a series of false claims declined over the duration of the course. Given the informal nature of the student reflections and survey, we shouldn't read too much into these responses. Regardless, they are, at the very least, encouraging.

It is my fervent hope that this article will inspire other high school teachers with an interest in critical thinking to propose similar courses in their own districts and that the scope and sequence and resources provided herein will help facilitate their efforts. In addition, I am also looking to connect with other high school teachers and college professors who have designed and taught their own critical thinking courses and pick their brains so I can improve my practice in the years to come. For that reason, if you have any ideas or suggestions about topics, activities, or resources, please contact me at the email listed in my bio. Thinking critically is critically important. Accordingly, I look forward to the day when courses such as this one will find their way into high schools across the country and even—dare we dream—become a requirement for graduation. ■

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Numerical Hygiene Lessons: Critical Thinking and the Central Tendency Fallacy

Having university students engage with anecdotes about statistics helps them understand dirty data.

WILLIAM MATTHEW LONDON

One of my favorites among the "Quotable Epidemiology Quotes" compiled on The Epidemiology Monitor website (epimonitor.net) is "We are always dealing with dirty data. The trick is to do it with a clean mind." It's attributed to the late Michael Gregg, who was the editor of *Morbidity and Mortality Weekly Report* and the textbook *Field Epidemiology*. I assume Gregg thought of the problems of inaccuracy and incompleteness in data as dirty. In epidemiological investigations, especially investigations to find the causes of sudden, unexpected disease outbreaks, epidemiologists must consider the limitations of relevant available data. They must carefully consider how erroneous their findings might be. They must take a clean-minded approach to quantitative reasoning. They must practice what I like to call "numerical hygiene." It's an important practice for all of us.

Numerical hygiene is also my label for instructional activities I've developed to promote numeracy. I describe numeracy as the practical application of quantitative reasoning and simple mathematical concepts to decision-making about issues of daily living. Numeracy is more about healthy skepticism than mathematical expertise. You don't need to be proficient at even high-school-level mathematics to develop numeracy. It's more important to develop cognitive reflection: "the ability or disposition to resist reporting the response that first comes to mind" (Frederick 2005, 35).

As an instructor of epidemiology and statistics, I have created or adapted various anecdotes as numerical hygiene problems for students to discuss in small groups. I hope their discussions combined with additional guidance have helped at least some students learn to respond prudently to numbers, tables, and graphs they may encounter in mass media.

Many skeptical inquirers have well-developed quantitative reasoning skills and would not be challenged by most of the numerical hygiene problems. But many of my students have been flummoxed by some of the problems and have underrated the challenge posed by others.

I've also come up with a few anecdotes I think would be useful as numerical hygiene problems for instructors of personal finance. They were inspired by misleading sales pitches for financial services I encountered as a guest at free dinner seminars that people of retirement age get invited to attend.

Two Central Tendency Anecdotes

In well over a dozen classes over the years, I've assigned these two anecdotes together for students to discuss in small groups:

Anecdote #1: Telling Others

A psychologist reported that women who have been raped took an average of nearly a year to tell another person about the crime. She said the finding provided overwhelming evidence that the women feared the court system would humiliate them. Furthermore, she suggested the one-year time lag was related to seasonal changes (such as the smell of spring or the leaves turning color) that brought back vivid memories of the crime. If you could look at the psychologist's data set, what about it would be important to examine closely? Why? Please note that your knowledge or lack of knowledge of the relevant research literature should have no bearing on how you answer these questions.

Anecdote #2: Abdominal Mesothelioma Diagnosis

Please try to imagine yourself in the position of someone who has just received a diagnosis of abdominal mesothelioma, a rare and serious cancer usually associated with exposure to asbestos. You are told the median survival time after discovery of the cancer is eight months. What is your immediate reaction? Now think more about it. What are your thoughts after giving the matter further consideration?

***

From class to class, students have been quite consistent in how they've responded to the anecdotes. Next, I'll summarize their comments. The summary includes hints about what I consider a clean-minded approach to the anecdotes. In a subsequent section, I'll share my take-home messages.

Students' Responses

When all small groups have finished discussing the anecdotes, I reconvene discussion with the entire class and invite students to share what they or their groups came up with.

Anecdote #1

Students frequently said they'd like to know how many women were studied. I suggest that for the purpose of the

discussion, we assume the sample size is adequate for coming up with meaningful findings.

I ask students what else they want to know. They consistently say they want more information about the women, such as their age, race, residential location, and so on. They often say they want more information about the rapists. I then point out that they are asking for information about other variables beyond the one variable mentioned in the problem statement. Students have frequently been stumped whenever I've asked them, "How will knowing more about those other variables help you make sense out of the psychologist's conclusions?"

When I've asked for someone to tell me what the one variable mentioned in the problem is, few if any have responded correctly that the only mentioned variable should be named something like "time taken after being raped to tell another person," or "time taken to tell" for short. The only information provided in the problem statement about time taken to tell is the average. What else would be worth knowing? Students have typically responded to that question with silence.

Anecdote #2

Students have almost always responded to the first question following it, as expected, with something like "fear," "doom," or "I'm going to be dead soon." The anecdote left many students speechless.

Giving the matter additional thought rarely gave students additional perspective. Many of the students had learned in other courses the meaning of *median* and how it's calculated. But students tend not to have an answer when I've asked why median rather than mean is used when talking about survival following a diagnosis of abdominal mesothelioma. And I don't remember a student ever being able to identify any other variable for which median rather than mean is commonly and appropriately used as a measure of central tendency.

My Take-Home Messages to Students

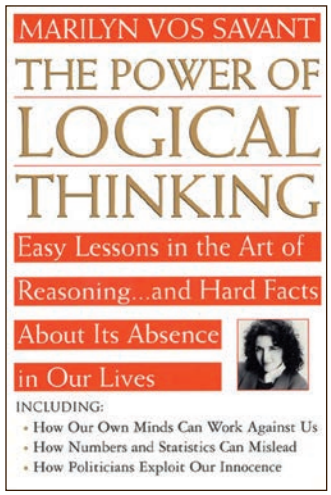
Students generally catch on, at least temporarily, when I provide comments about the anecdotes orally and in writing. Here's what I've written up for them:

Anecdote #1

We are told that women took on average nearly one year to tell someone about being raped and that the researchers hypothesized seasonal triggers were an explanation. Usually, when we encounter an average for a sample, the average is the mean. The sample mean is the sum of all values in the sample for the variable of interest divided by the sample size.

The anecdote appears in Marilyn vos Savant's illuminating book *The Power of Logical Thinking*. Savant discusses what she found by looking closely at the data:

> It turned out that the great majority of women in the study had reported being raped to the authorities almost immediately, but a few were so ashamed about it that they didn't admit it to another soul for ten or twenty years. Add these two groups together, and what was the "average" reporting time? One year. (An analogous example would be if nine women reported a rape to the police immediately, and one woman waited ten years, then told her best friend. Ten years divided by ten women equals an average reporting time of one year.) But not a single woman actually waited a year! Far from it, in fact. The situation was turned into fiction, then crowned with a groundless conclusion. (Savant 1996, 69)



The anecdote illustrates what I call the central tendency fallacy[1]: assuming that a measure of central tendency such as mean, median, or mode (the most common value) represents a typical value. We need much more than a measure of central tendency (sometimes called measure of centrality or measure of location) to adequately summarize a data set. An important task in descriptive statistics is to characterize the variability and shape (when graphically represented) of our data. A dataset must be adequately summarized before drawing conclusions.

Anecdote #2

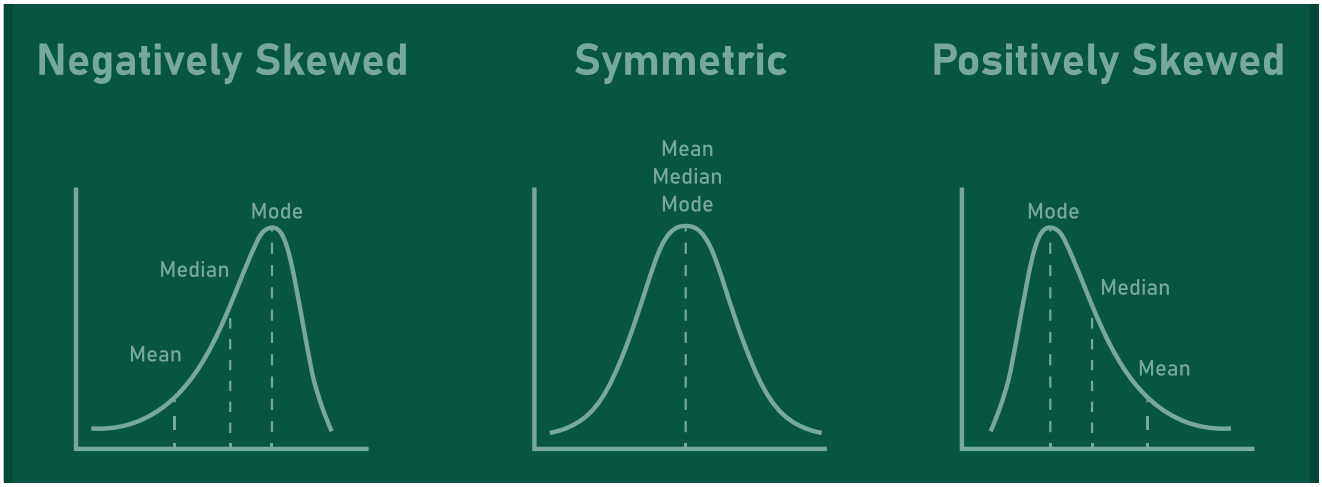
This abdominal mesothelioma diagnosis anecdote comes from Stephen Jay Gould's essay "The Median Isn't the Message" (Gould 1991). After receiving this diagnosis, Gould learned that median survival time was eight months. But he recognized that the median value (also known as the fiftieth percentile value) divides a distribution of values into two halves and that the median is the preferred measure of central tendency when a distribution is markedly skewed (i.e., asymmetric) because of values either much greater than the median (positive skewness) or much less than the median (negative skewness). He recognized that variation in survival time after an abdominal mesothelioma diagnosis must be positively skewed. While 50 percent of people receiving his diagnosis survive less than a month to up to eight months after the diagnosis was made, the other 50 percent survive more than eight months with no upper limit implied by the median survival time. He recognized he could possibly survive much longer than eight months.

Gould received his diagnosis in July 1982, and he died in May 2002 of metastasized lung cancer ("Paleontologist, Author Gould" 2002). The fatal cancer was unrelated to his abdominal mesothelioma (Associated Press 2005).

Medians Misinterpreted

Over the years, when I've asked students about when to use the median rather than mean, the best answer I've received has been when there are outliers (one or a few extremely low

1. A Google Scholar search on "central tendency fallacy" yielded no results. The only reference in English to "central tendency fallacy" I found in a general Google search used the term differently. It described it as the tendency of raters conducting performance appraisals to avoid making extreme assessments of employee performance.



or high values). I don't recall students ever identifying the skewness of a distribution of values as the key consideration, even when they've taken a statistics course. I also don't recall students being able to give me an example of a variable of interest in public health or social science research for which median is always used because of significant skewness.

The example I offer of a skewed distribution is household income. According to the U.S. Census, the median annual household income in Los Angeles County from 2017–2021 (in 2021 dollars) was $76,367. That modest median doesn't prevent some people in Los Angeles County from making tens of millions of dollars per year, just as a median of eight months survival from abdominal mesothelioma doesn't prevent someone from living for decades.

I don't think I've succeeded at getting most of my students to appreciate skewness and the central tendency fallacy, especially the median-survival-time version of the fallacy. I don't know how I can have a greater impact. All that comes to mind is a cliché: more research is needed.

In every class that I've given the central tendency lesson and assigned students to read "The Median Isn't the Message," many students have answered the following exam question incorrectly (even when I have administered exams online and permitted students to consult instructional resources):

> A patient is told that she has abdominal mesothelioma and that the *median* survival time after diagnosis is 8 months. Which conclusion would she be correct to make based on this news?
>
> A. Most people with her diagnosis die in 7–9 months.
>
> B. Hardly anyone with her diagnosis survives more than 8 months.
>
> C. Hardly anyone with her diagnosis survives more than 16 months.
>
> D. If the distribution is positively skewed, some people survive for many years.

The correct answer is choice D. Those who choose A commit the median-survival-time fallacy. Those who choose C fail to appreciate the skewness of the distribution of survival times. When students choose B, I think about cancer patients who are told that the median survival time from diagnosis for similar patients is eight months and interpret the news as "the doctor is telling me I have eight months to live."

When cancer patients who choose unproven treatments live longer than what their oncologists supposedly "gave them to live," it's no surprise when they give credit to the unproven treatment. I wonder how often those patients misinterpret median survival time as maximum possible survival time medicine can provide them.

Final Thoughts

I like to boldly declare to my students that introductory statistics courses are "the ultimate diversity courses." It seems that contemporary usage of *diversity* may obscure what the word meant when I was a student and still also means: variety or multiformity. I argue that statistics is the ultimate diversity course because it offers tools for describing and quantifying variation—including quantifying inequality.

It's important to carefully consider variation in data to avoid succumbing to the central tendency fallacy. It can be challenging to effectively guide people to make such careful consideration a habit of thought. Perhaps the best response to the challenge is to place greater emphasis on the promotion of all aspects of numerical hygiene to students before they make it to college. ■

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Critical Thinking about Our Vulnerabilities to Misinformation

Through active instruction, Generation Skeptics and Thinking Is Power help educators infuse better thinking into social media, workplaces, communities, technology, parenting, and public discourse.

BERTHA VAZQUEZ AND MELANIE TRECEK-KING

Quick! Name one thing you've been wrong about: Homeopathic treatments? Chiropractic care? The aliens at Roswell? We can both certainly name more than one. The realization that we had been wrong about a cherished belief is not an easy pill to swallow. It's a journey whose path was lined with self-doubt, humility, and fear of alienating the people we most care about.

Alienating People We Care About

Going against our fellow tribe members or people in our social circles is perhaps the most difficult part of changing one's mind. We can think of dozens of times we debated with others having different positions on religion or politics. While not our favorite thing to do, it was certainly not terribly uncomfortable. On the other hand, the rare occasions when we have questioned the beliefs we hold in common with members of our own political party or secular tribe have been quite anxiety-provoking. Often, we've decided to hold our tongue instead of risk it. It helped us understand why Christians may keep quiet years after they stop believing in God.

The thought of losing your community may be worse than the thought of eternal damnation. We are a social species, after all. We evolved in small hunter-gatherer groups. Our tribe protected us from danger and took care of us throughout our lives. Back then, being banished from our tribe could spell death—or at the very least social isolation and loneliness.

Aligning our beliefs with our community is our natural tendency. We think we process new information through the lens of rationality and honest analysis, but we often assume the position of our tribe without really thinking things through. How many American liberals can pass a Biology 101 exam on evolutionary biology? Probably not many, but they accept evolution the same way a young-earth creationist accepts that the biblical flood caused the layering in the Grand Canyon. Our point is not to dunk on an entire political group; it's to say we all think our beliefs are based on rational decision-making, but if we're honest with ourselves, we might find we don't know as much as we think we do.

We can teach students to evaluate claims and sources until the cows come home. Still, if we do not address our own vulnerabilities to misinformation, we can't hope to protect ourselves or slow its spread. *Epistemological vigilance* refers not just to evaluating the claim itself or its source but also to evaluating the receiver—that is, ourselves.

Educators today face significant challenges in addressing misinformation. Despite time constraints, packed curricula, and state assessments hanging over their heads, they do a wonderful job with the first two steps of epistemic vigilance: evaluating a claim and its sources. Our programs, Generation Skeptics and Thinking Is Power, strive to help educators with the all-important third component: evaluating the receiver.

Generation Skeptics and Thinking Is Power

Generation Skeptics offers educators practical solutions to seamlessly integrate critical thinking and skepticism into their existing classroom lessons. The program provides free lesson plans and resources aimed at teaching students from K–12 essential skills such as critical thinking, healthy skepticism, and identifying fake news. Generation Skeptics suggests several strategies:

- Bellringer Activities: Administering short, engaging exer-

cises at the beginning of class to prompt students to think critically about information they encounter daily.
- Curriculum Integration: Aligning their content with existing educational standards allows teachers to incorporate lessons on skepticism without overhauling their current plans.
- Extracurricular Programs: Offering after-school sessions, summer camps, and club opportunities to provide additional avenues for students to delve deeper into critical thinking and misinformation topics. By utilizing these resources, educators can effectively teach students to navigate and critically assess the vast amounts of information they encounter.

Thinking Is Power offers an entire course and over 100 videos on critical thinking, information literacy, and skepticism. The program is based on three education pillars:
- Teach Skills, Not Facts: Learning actual skills related to critical thinking, information literacy, and science literacy.
- The FLOATER Toolkit: Evaluating claims by examining Falsifiability, Logic, Objectivity, Alternative explanations, Tentative conclusions, Evidence, and Replicability (see the March/April 2022 Skeptical Inquirer).
- Inoculation Against Misinformation: Understanding how misinformation is created by experiencing what it's like to create it for yourself (without actually spreading it to others).

Beyond the Classroom

We have both been approached at skeptics conferences by those who want to see more critical thinking taught in schools. We agree! We are also asked how we can help by those who are not educators. There are some alternative ways to encourage epistemic vigilance (critical thinking about beliefs and biases) outside of schools.

Workplaces cultivate critical thinking because it can foster more productive conversations and improve decision-making. Many companies already include ethics and leadership training, making it a logical step to add workshops that focus on reasoning and cognitive biases. Businesses can also adopt structured decision-making frameworks that require employees to examine their assumptions. Techniques such as "red team" exercises, where one group is tasked with challenging the prevailing perspective, can help organizations develop more rigorous, bias-resistant decision-making processes.

Community and social groups can foster a culture of epistemic vigilance through structured discussions. Organizing philosophy clubs, debate nights, and Socratic discussion groups all provide a setting in which people can engage with differing viewpoints and analyze their own beliefs. Faith-based and civic organizations can also integrate discussions about cognitive biases into their meetings, helping members develop a more thoughtful approach to evaluating ideas and information.

Technology can be leveraged to encourage better reasoning in everyday life. Artificial intelligence tools and browser extensions that highlight cognitive biases in real time, such as fact-checking pop-ups or bias-detection software, can help individuals recognize flaws in their thinking as they engage with content online. Gamification is another promising approach; apps and interactive games that teach logical reasoning by challenging users to spot fallacies or misinformation can make learning about biases engaging and accessible.

Parenting and everyday conversations are also powerful avenues for instilling critical thinking. Parents can naturally incorporate epistemic vigilance into daily interactions by asking children why they believe something while encouraging them to seek multiple perspectives. Family discussions during which everyone justifies their choices—such as debating the credibility of a news story or explaining why a particular movie is the best—can create habits of questioning and reflection from an early age.

Public awareness campaigns can further reinforce the importance of epistemic vigilance. Billboards and advertisements that highlight common biases—such as messages reminding people that "just because it feels right doesn't mean it's true"—can prompt individuals to pause and reconsider their assumptions. Libraries and science museums can also contribute by hosting exhibits or workshops on critical thinking that feel engaging and natural rather than resembling formal education.

Social media and pop culture can play a significant role in promoting critical thinking. Encouraging influencers, YouTubers, and podcasters to incorporate content that fosters epistemic vigilance can be highly effective, because people tend to absorb information more readily from sources they already follow. Similarly, the entertainment industry can help by promoting movies, TV shows, and books that naturally challenge assumptions and biases. Sci-fi, satire, and detective stories, for example, often require logical reasoning and can subtly encourage more analytical thinking.

We hope Generation Skeptics (generationskeptics.org) and Thinking Is Power (thinkingispower.com) will help educators; beyond the classroom, critical thinking should be integrated into social media, workplaces, communities, technology, parenting, and public discourse. Epistemic vigilance can become a cultural norm, not just something we should strive to teach in our schools. ■

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Chupacabra Revisited: Dueling Origin Stories of the Hispanic Vampire

The first report of the chupacabra dates to a single eyewitness in 1995. Though long regarded as canon, later interviews about this seminal sighting reveal important discrepancies about one of the world's most famous cryptozoological beasts.

BENJAMIN RADFORD

Figure 1: The first depiction of the chupacabra in *The X-Files*. Screenshot by the author.

The chupacabra is a curious cryptozoological creature for many reasons. Unlike Nessie or the Yeti, it's a uniquely American creation; despite its reputation and reports reaching around the world—and close association with Mexico—the creature was first sighted on the small Caribbean island of Puerto Rico. Unlike Bigfoot or Mothman, it's also a vampire, said to suck blood from goats and other animals.

It's also a very recent addition to the monster club, appearing first only thirty years ago in 1995. As detailed in a previous Skeptical Inquirer article, the original eyewitness, a Puerto Rican woman named Madelyne Tolentino, described the creature based on the H.R. Giger–designed monster Sil in the sci-fi/horror film *Species*. While early pop culture versions of the beast were silly or scary, more modern versions (such as the one in the 2023 film *Chupa*) are cute and friendly—part of a long history of sanitizing and Disneyfying creepy creatures, from mermaids and lake monsters to fairies and djinn.

Most accounts of Tolentino's 1995 encounter offer only a brief summary and little in the way of detail or context. While key sightings of other monsters have received extensive analysis—Roger Patterson and Bob Gimlin's 1967 alleged encounter with a Bigfoot, for example, or Chris Davis's 1988 sighting of the Lizard Man (see the May/June 2023 SI issue)—Tolentino received scant investigation even at the time.

In the months after her sighting, Puerto Rico was abuzz

Figure 2: Puerto Rico's El Yunque rainforest, said to be the home of the chupacabra. Photo by the author.

with rumors, tabloid stories, and reports about the beast. Armed mobs patrolled streets searching for the creature, and the mayor of Canóvanas, José "Chemo" Soto Rivera, courted local press (and voters) by promising to protect the public from the terrifying menace. (For an update on the chupacabra's place in current Puerto Rico, see my column in the July/August 2020 SI issue.)

However, as the years passed and no hard evidence of the vampire surfaced, interest waned. The chupacabra was culturally appropriated by the rest of the world via *The X-Files* (see Figure 1), tabloids, and television shows, and by the time the first dead canid version appeared in 2000 on a ranch outside of Managua, Nicaragua, it had largely faded from Puerto Rico as a threat. The chupacabra was commodified and commercialized, resembling Tolentino's original sighting less and less with each iteration and passing year.

I spent five years researching the chupacabra for my 2011 book *Tracking the Chupacabra: The Vampire Beast in Fact, Fiction, and Folklore*. I interviewed Tolentino, and in my book, I described her encounter with the monster. Space constraints prevented an in-depth analysis, so the full story of her original sighting can finally be revealed.

Figure 3. The author with Madelyne Tolentino and José Miguel Agosto at the site of her 1995 chupacabra sighting. Photo by the author.

Tolentino's Chupacabra

The first chupacabra sighting took place near Calle 1 and Calle 2, not far from the Iglesia De Dios church in the small town of Barrio Campo Rico in Canóvanas, Puerto Rico. A suburb of the capital, San Juan, the town is a semi-rural area a few kilometers from the El Yunque rainforest (reputed to be the creature's home; see Figure 2). The incident occurred at some point during the second week of August 1995 (Tolentino doesn't recall the date but says it was a weekday, which places it between August 7 and 11) and between 1 p.m. and 4 p.m. She said the sighting lasted from three to five minutes.

Figure 4: Eyewitness Tolentino at the spot where she first saw the chupacabra. Photo by the author.

Figure 5. Model of the early Chupacabra from the author's collection. Photo by the author.

Though it happened near a fairly busy road, during that time no other cars appeared.

This article incorporates two in-depth interviews Tolentino gave: one in March 1996 to Lucy Pla and José Manuel Rodríguez of the UFO-themed Puerto Rican Research Group, translated into English and published in the 1997 Scott Corrales book *Chupacabras and Other Mysteries*, and an interview I conducted in 2010 with Tolentino and her (now ex-) husband José Miguel Agosto at the location of her original sighting[1] (Figure 3).

The 1995 Chupacabra as of 1996

In her 1996 interview, Tolentino (see figure 4) described the encounter:

> I was helping my mother, since she was getting ready to move into that location. I noticed that a vehicle was about to park right outside the house. I looked to make sure it wouldn't block access to the house. Then I noticed that the fellow driving the car was frightened. His eyes opened wide, and he started backing out. His attitude led me to believe that someone was going to hit him or mug him. It made me go up against the glass window, which is quite wide and faces the front of the house. I then became aware of the creature, walking on two legs, apparently having come quite a distance, from the corner … It stood in front of the window I was looking out. (Corrales 1997)
>
> The creature was about four feet [tall], more or less. At the time, it was walking like a human, on both legs. Its arms were drawn back in an "attack position," as though it were a [TV or film] monster. It had three long, skinny fingers. The arms were also very long … Its legs were long and skinny, and I could see three separate toes … For a nose it had two little holes, and its mouth was a slash … I noticed something odd on its lower back … They were like feathers, but flat on its back. At no point did they rise. [In an interview conducted by Marc Davenport in February 1996, Madelyne said the "feathers" became erect and moved rapidly from side to side.] (Editorial comment in original; Corrales 1997)

As to eye color, Tolentino said in the interview that they were dark gray, though the interviewer notes "In an earlier interview, Madelyne said the eyes appeared black." (See Figure 5; later versions claimed the eyes were red, a detail that has become canon for many monsters. See, for example, Radford 2020.)

"It was such a weird creature that I even got down on the floor to see if it had genitals. It had nothing at all—it was 'plain' and sealed. I laughed, and said to my mother, 'What the heck is this? Does it defecate through its mouth after it eats?'" Tolentino described its

> slow, robot-like movements, as if being controlled by someone … as if being guided by remote control. Like a robot … Had that thing appeared in front of me, I would have run, but since it was behind the glass, and there was a gate outside the glass, I thought, "That thing can't harm me in here." Meanwhile, when my mother heard me scream [Tolentino didn't explain when or why she screamed after being comforted by the notion that she was safe from it] she decided to go out and grab the creature … The thing took off running. I'm not sure if it was because I screamed or not … It kind of hopped, like a kangaroo … It plunged into the woods over there, where you see that palm tree [see Figure 6]. My mother ran after it. I went outdoors, but stayed far away … My mother was in there trying to catch it. There was a kid on a bicycle who went crazy when he saw the creature. He threw broken bottles at it. My mother shouted to a neighbor, "Catch it! There it goes!" … when the creature heard what my mother shouted, it started running much faster than it had. Its feet weren't touching the ground. It was as if it had been suspended in the air, floating. Then it disappeared down that other street facing the church [see Figure 7]. (Corrales 1997)

Amid this bizarre and chaotic scene—after her elderly mother tried and failed to capture the beast—Tolentino said that a young boy who worked for Agosto succeeded, chasing the monster down and then opening its mouth:

> A boy who works for my husband is always willing to deal with animals [and] keeps a pair of gloves in his car. He put them on and went into the woods to catch the creature. He says that, when he tried to grab the creature, it whipped out what I thought were feathers. He says that they stood straight up and that they were very long spines. The spines changed colors. He says he pried its mouth open and saw that it had really large fangs. He kept on trying to grab it and the thing ran into the woods. (Corrales 1997)

1. The details and descriptions from her 1996 interview may be considered more reliable than her more recent recollections, though it's important to note that they are second- or thirdhand, having been conducted in spoken Spanish, translated into written English, and then edited for publication. In accounts of mysterious events that rely wholly on a single eyewitness—as in this case—crucial details can be lost or changed over iterations. The Puerto Rican researchers did not respond to requests for copies of the original tapes.

Figure 6: Path to an overgrown area across the street from Tolentino's former home where the chupacabra escaped. Photo by the author.

Figure 7: The street where Tolentino last sighted the chupacabra. Photo by the author.

At that point, the excitement ended. No police or press were summoned, and the incident wasn't mentioned again until over a month later, when Tolentino's story was reported in tabloids, such as *El Vocero*, and local radio shows.

In reexamining her original report, we find an elaborate—and wholly implausible—description that goes far beyond the creature's brief appearance and description. It's perhaps understandable that those who believe the chupacabra is real have elided much of her story. But we cannot arbitrarily pick and choose which parts of Tolentino's eyewitness account to credit; if there's reason to suspect that she is misremembering, misrepresenting, or embellishing so many important details of her experience, there's reason to see all of it in a skeptical light.

The 1995 Chupacabra as of 2010

In June 2010, I interviewed Tolentino and Agosto, both at her current home and at her previous residence, where she had the sighting. I found both to be open, helpful, and sincere (though Agosto had little to add, because he wasn't present at the incident).

Tolentino's basic description of the creature didn't change significantly between 1996 and 2010—though her description of the encounter itself did, offering a markedly different version of the events. Tolentino told me that only she and her mother saw the creature. Tolentino was sleeping, and her mother woke her up shouting that she'd seen some strange animal outside.

In contrast with her 1996 account, Tolentino said her mother did not leave the house, but instead the pair watched the creature as it stood outside the window for a while. "My mother said, 'I'm going to grab it,' and she opened the door and started to go out. I asked my mother, 'How are [you] so brave?'" It then floated (or hopped) toward tall grass in a vacant lot across the street; then it disappeared. "We looked each other in the eyes, and I screamed … It was suspended it the air, left me without words, [then] disappeared into the tall grass."

Tolentino corrected several mistakes in the famous drawing by UFO researcher Jorge Martín claimed to be based on her sighting (Figure 8). For example, the creature was about three feet tall (not four to five, as had been reported). As she had described earlier, at one point she stooped down to see if there were any genitals on the creature, "But it was 'plain'; there was nothing there at all. And the hair was short, so I would have seen if there had been any type of genitalia. This made me think it was not of this world."

Furthermore, it did not have three fingers (as she stated in her 1996 interview) but instead five, and those five fingers did not end in claws, as was widely reported, but instead looked human. "There were no claws," Tolentino told me categorically. She told me:

> It had human hands—not claws but long fingers and human-like nails. Its eyes were big and [slanted], and it didn't have a nose, just two little dots. The creature's skin was not brown but grayish … it looked like leather, wet and wrinkled. Its skin was like an extraterrestrial—but I never said it was an extraterrestrial. I have an interest in UFOs and aliens, but I never said it was either an extraterrestrial or an animal. I don't know what it was. I've never changed my story.

When I asked her, she told me how it moved: "It was skipping like a kangaroo, but it had no tail. It did not touch the ground … it had no wings, but it came out like it was running as it approached." (I asked her how it could be skipping *and* hopping *and* not touching the ground, but I did not get a clarifying answer.)

The 1996 version told a dramatic story of how (after searching it for genitals) she didn't run or panic—or look for a camera—but instead made a joke about it with her mother, then inexplicably screamed. Her mother then bravely chased the bizarre, otherworldly creature to try and catch it. She failed, but a local boy managed to chase it into the woods, grab the monster, pry its mouth open, and then release it.

In the version she described to me, none of that happened: They both stayed inside the house and watched as the creature floated (or skipped, etc.) away into a wooded area across the street. As for the brave boy who gave the weird creature an impromptu dental exam, despite apparently initially endorsing the boy's story, Tolentino told me it never happened: "Jose had a young worker who used to help him fix cars, and he ran

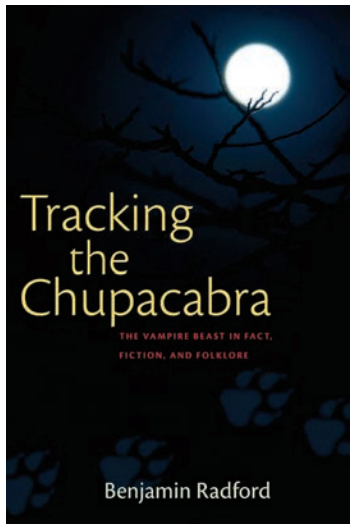
Figure 8: Illustration by the author of the depiction of Tolentino's chupacabra, originally by Jorge Martín.

out to see, but he did not see the chupacabra." (It's not clear whether Tolentino had since come to doubt the boy's account or whether his story had never been credibly proffered in the first place.)

Conclusion

If Tolentino's accounts are accurate and truthful, she has remarkable powers of observation; most witnesses would have only remembered a few of the most obvious features, but she spills out detail after detail in her description, from its eye color (albeit she has several different answers) to the number of toes on its feet to its notably absent anus.

The members of the Puerto Rican Research Group apparently didn't conduct any investigation beyond interviewing Tolentino months after the fact. Perhaps most damning, there is no corroborating evidence of Tolentino's story whatsoever: no physical proof or traces at all or any photos or other eyewitnesses. In all, based on her 1996 account, there would seem to be at least a half dozen potential eyewitnesses to the sighting: Tolentino, her mother (who was unavailable to be interviewed due to infirmity), the (unnamed) local boy (who may or may not have chased the monster and pried its mouth



open but may have been present and seen *something*), one or more neighbors, and the man whose vehicle-parking habits brought Tolentino to the window in the first place. Not a single one of them has ever come forward to corroborate her account or offer their recollections (of course if the version she told me in 2010 is to be credited, they either don't exist or have nothing to say).[2]

Tolentino told me, "Most people have believed me; people trust me and know I'm telling the truth. The whole experience seemed both real and unreal at the same time … Others were making up pictures for sensationalism, but I [reported it] because I have good vision and wanted to put it down as I saw it … I have the most information, and I have never changed my story."

Whether Tolentino is aware of it or not, her story has in fact changed significantly and demonstrably. Memory is notoriously fallible under the best of circumstances, but it's hard to reconcile the different versions of this original, influential chupacabra report. We don't know, and at this remove can't conclusively prove, what (if anything) she saw that day—what the floating, gray-skinned, long-fingered, spiky-backed alien humanoid figure was. But as Tolentino acknowledged in her 1996 interview, her "chupacabra" looks remarkably like a monster in a film she'd recently seen, "a movie called *Species*. It would be a very good idea if you saw it … It was a creature that looked like the chupacabra, with spines on its back and all … The resemblance to the chupacabra was really impressive." ■

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2. Though otherwise quite credulous—and eager to infuse extraterrestrial interpretations into her story—to their credit the Puerto Rican researchers did note several obvious contradictions between what Tolentino had previously told them and what they were hearing at the time of the 1996 interview, such as about the eye color and actions of the spikes or feathers on its spine.

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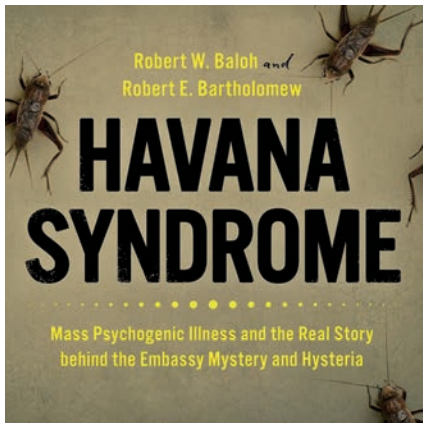
Latest Havana Syndrome Reports Support Mass Sociogenic Illness Explanation

BENJAMIN RADFORD

As 2025 began, the U.S. government issued two reports about the origins and nature of Havana Syndrome, both supporting a psychosocial—not a military—explanation for the mysterious phenomenon. Beginning in 2016, spies and diplomats in Cuba, and later elsewhere, reported hearing an unexplained noise or feeling a change in air pressure followed by nausea, headaches, dizziness, fatigue, and other symptoms. While some symptoms were temporary, others persisted for months and years, sometimes even after staff left their posts for other locations. The phenomenon was later dubbed "Havana Syndrome," after the city where the incidents began. The only clue about its origin was that a high-pitched sound was heard at the time in many cases. The (presumed) attacks were taken seriously by the State Department; complaints were lodged against China and Russia as Cuban diplomats were expelled.

Others, however, including sociologist Robert Bartholomew, were skeptical that it was an attack at all and suspected that it was instead a case of mass sociogenic illness (MSI), which has been implicated in many other "mysterious attacks" (see, for example, "Mass Hysteria at Starpoint High" in the January/February 2007 SI and "The Mad Gasser of Mattoon" in the July/August 2002 SI issue). The origins and nature of the phenomenon (dubbed anomalous health incidents, or AHIs) remained unresolved—that is, if you reject the mass sociogenic illness evidence and explanation—for years and officially remains so today.

A report from the U.S. Senate's Select Committee on Intelligence on Havana Syndrome was recently released, noting



that "Although initial reports led many inside and outside the U.S. government to believe that foreign adversaries were attacking [U.S. government] personnel with an acoustic or directed energy device that caused traumatic brain injury-like symptoms, subsequent intelligence analysis has cast doubt on that hypothesis."

The reports also provide insight into how and why the government was so quick to assume that the incidents were intentional assaults:

> The foreign adversary "attack" hypothesis formed after the first AHIs were reported from Cuba. The attack hypothesis also contributed to initial assessments that AHIs were synonymous with traumatic brain injuries (TBIs) since the first medical personnel to examine the AHI reporters from Cuba noted that they presented with signs and symptoms analogous to a TBI. Given the lack of intelligence on AHIs at the time, CIA adopted the "attack" and TBI hypotheses as its working organizational position.

While some research concluded that the AHI symptoms might reflect traumatic brain injury, the link was correlational, not causational. By way of example, there are many causes of headaches, dizziness, and fatigue—including stress, medication, blood sugar spikes, and brain injury. What's needed to narrow the diagnosis is external evidence, which is lacking. (For a more detailed analysis, see *Havana Syndrome: Mass Sociogenic Illness and the Real Story behind the Embassy Mystery and Hysteria* by Robert Bartholomew and Robert Baloh, reviewed both online and in Skeptical Inquirer.) News programs, including *60 Minutes*, amplified these fear-mongering and baseless claims (see "Smoke and Mirrors: The *60 Minutes* 'Breakthrough' on Havana Syndrome Exposed").

As a result, the CIA was then obligated to provide medical care and benefits for the afflicted staff; it also spurred Congress to pass the Helping American Victims Afflicted by Neurological Attacks (HAVANA) Act of 2021, which solidified the connection between AHIs and brain injuries. However, as more and more information came in, the CIA and the March 2023 Intelligence Community Assessment concluded that the AHIs were *not*, after all, likely the result of foreign adversary attacks. The report notes:

> Seven years after the first AHI reports in Havana … there is now broad acknowledgement across the U.S. government, medical, and research communities that not all of the reported AHIs have the same cause—and that many reported AHIs are likely attributable to naturally occurring medical conditions, environmental exposures, or psycho-social factors.

This, of course, is what researchers such as Bartholomew were saying from the start; see his accompanying article in this issue.

As *The Washington Post* reported in

2023:

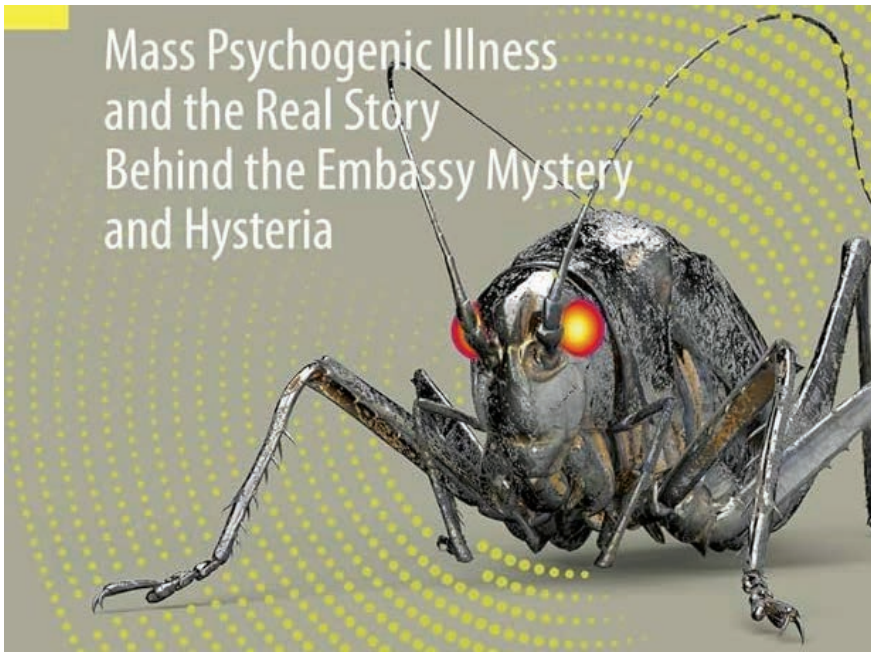
> The officials said that as analysts examined clusters of reported cases, including at U.S. embassies, they found no pattern or common set of conditions that could link individual cases. They also found no evidence, including forensic information or geolocation data, that would suggest an adversary had used a form of directed energy such as radio waves or ultrasonic beams. In some cases, there was no "direct line of sight" to affected personnel working at U.S. facilities, further casting doubt on the possibility that a hypothetical energy weapon could have been the culprit, one of the officials said.

The reports also offer insight into the evolving evidence and explanations. To much of the world, Havana Syndrome was a mysterious phenomenon, but to those afflicted, the AHIs were a work-related injury, akin to a slip and fall at the office or a delivery driver in a car accident: "Some AHI reporters struggled to get their medical providers to attest that the AHI reporter experienced a TBI or 'acute onset of new, persistent, partially or totally disabling neurologic symptoms' demonstrated by imaging studies or other exams and that required active medical treatment for 12 months or more."

In other words, part of the reluctance for many people to accept the mass sociogenic illness explanation is that if the symptoms were *not* the result of an unknown weapon by a foreign enemy, then it would not be a work-related injury and therefore they would not be entitled to treatment and compensation. This is compounded by a common reluctance to accept mass sociogenic illness explanations, because the public often—albeit wrongly—thinks that the label suggests that the victims are faking or imagining their symptoms.

Separately, the National Intelligence Council issued a January 10 report, *Updated Assessment of Anomalous Health Incidents, as of December 2024*, which also confirmed that the intelligence community is skeptical that AHIs were caused by any weapon or enemy:

> In judging that it is "very unlikely" that a foreign actor is responsible, five [intelligence community] components place emphasis on sensitive intelligence reporting continuing to point away from foreign involvement in AHIs, the [intelligence community] investigations of key incidents reported as possible AHIs, and a review of foreign intelligence and research regarding the development of novel weapons. Two components still have moderate-to-high confidence in this judgment, and three components still have moderate confidence. These components also judge it is "very unlikely" a foreign actor has used a novel weapon or prototype device to harm even a subset of the [U.S. government] personnel or dependents who reported medical symptoms or sensory phenomena as AHIs.



In other words, it thinks that even if some enemy has developed some secret sonic weapon capable of doing the damage reported—and it probably hasn't—*it probably had nothing to do with the AHIs or Havana Syndrome*. The overall conclusion is clearly and strongly in favor of an explanation consistent with mass sociogenic illness.

As *The New York Times* noted in a recent article:

> An official from the Office of the Director of National Intelligence … said sensitive intelligence, and not an absence of evidence, had led several agencies to that conclusion. Officials have previously said that no communications or other information indicated that Russia, China, Cuba or another adversary had orchestrated the attacks. Some intelligence shows that foreign operatives were confused about Havana Syndrome allegations.

In other words, when spies and surveillance intercept internal Russian and other intelligence agencies communications saying "Huh? The Americans think we have some top-secret sonic superweapon? What are they talking about?" there's a good chance they had nothing to do with it—and all the more so when there's no plausible mechanism or evidence of it.

It is true there is no ironclad, definitive explanation or treatment for Havana Syndrome, just as there isn't for many psychological maladies. Science does not operate on absolute certainties but instead the best evidence available at the time. There is simply no evidence that any foreign power has, or has used, some heretofore unknown top secret sonic weapon against U.S. diplomats, spies, or anyone else. It remains possible that, years or decades from now, the intelligence community will discover new proof that some unknown sonic weapon was in fact deployed against the victims. But until then, these reports (along with Havana Syndrome and Occam's razor) make a compelling case that mass sociogenic illness plays a major, if not definitive, role in the phenomenon. ■

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FORUM]

The Politics of Havana Syndrome

ROBERT E. BARTHOLOMEW

Benjamin Radford has provided an excellent overview of the ongoing controversy surrounding the origin and nature of Havana Syndrome (see "Intelligence Agencies: 'Havana Syndrome' Not Attack" in the July/August 2023 SI and the accompanying article). It is worth remembering that government officials under the first Trump administration, including Donald Trump himself, initially concluded that a nefarious foreign actor was most likely responsible for the symptoms reported in Cuba and later around the world. Subsequent intelligence agency assessments under the Biden administration deemed this "highly unlikely." So why do several Republican politicians continue to challenge these more recent assessments and make statements that discredit the intelligence community? Clearly, they are unhappy with the findings and would like to see them reevaluated.

A major driver of Republican discontentment with the new intelligence reports is likely the circumstances surrounding the first twenty-one American victims in Havana, which prompted the initial investigation in 2017. Eight made audio recordings of their "attacks." They were analyzed by a group of government scientists, who concluded they were in fact the mating calls of crickets (*Acoustic Signals* 2018). Curiously, this report remained classified until years later, when it was obtained under the Freedom of Information Act (Vergano 2021). Another investigation was conducted by the FBI. They concluded that mass psychogenic illness was the stimulus, yet this report remains classified to this day, although the conclusions were leaked (Entous 2021). It is embarrassing that for the past eight years, the U.S. government has spent tens of millions of dollars to investigate Havana Syndrome—and even paid compensation to "victims" (assuming its cause a work-related illness)—when this affair was likely triggered by insect mating calls.

It is interesting to note that the most serious symptoms—brain damage, white matter tract changes, and hearing loss—while widely reported in the media were never demonstrated (Bartholomew and Baloh 2024). For instance, a 2019 study in the *Journal of the American Medical Association* identified brain anomalies in the U.S. diplomats in Cuba (Verma et al. 2019). Media outlets jumped on this story, and it was widely reported that the victims were suffering from "brain damage." But if journalists had taken the time to read the study more closely, they would have seen that in the Discussion section the authors admitted that the anomalies were relatively minor and could have been caused by individual variation. Also absent from most news reports was the observation that it is not uncommon to find minor brain anomalies in small cohorts that are under long-term stress. Brain *anomalies* are not the equivalent of brain *damage*. As for the claims of hearing loss in some victims, that was a result of media reports that turned out to be untrue (Baloh and Bartholomew 2020).

So when you remove claims of brain damage and hearing loss, you are left with a long list of symptoms. These include headaches, dizziness, nausea, forgetfulness, confusion, difficulty concentrating, fatigue, balance problems, tinnitus, ear pain, head pressure, insomnia, and even depression. These symptoms are very common in any population. A study conducted by psychologist Keith Petrie of Auckland University several years ago surveyed 1,000 people who were read a list of forty-six symptoms and asked if they had experienced any over the previous seven days; the average was five symptoms. Nearly 36 percent reported fatigue, 35 percent noted headaches, and about 30 percent said they had insomnia. Other symptoms included difficulty concentrating (15 percent), depressed mood (14 percent), memory problems (12 percent), eye or vision issues (11 percent), and ear or hearing problems (11 percent). Nausea and dizziness came in at about 8 percent (Petrie et al. 2014). These are all symptoms of Havana Syndrome.

If you think I am exaggerating about this issue being politicized, consider this: In May 2024, a Congressional subcommittee Hearing on Counterterrorism, Law Enforcement, and Intelligence was held in Washington, DC. The title of the Republican-controlled hearing was "Silent Weapons: Examining Foreign Anomalous Health Incidents Targeting Americans in the Homeland and Abroad." In my written testimony to the Hearing, I wrote that the title shows the game that was being played. "It has been framed with a blatant bias and stacked with testimony from believers to score political points by attempting to embarrass the intelligence community under the Biden Administration by perpetuating the myth that Americans are being targeted with directed energy weapons." It was true then, and it remains true.

Maybe someday evidence will be produced to prove that American diplomats and spies are being zapped by energy weapons, but there remains no credible evidence to suggest that this is happening. Social media is rife with allegations and conspiracy theories—such as claims surrounding alien abductions and crashed saucers—but the evidence is also lacking. ■

Note

References can be found in the digital version of this article at skepticalinquirer.org.

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FUN & GAMES

Edited by Stephen Hupp

YOU CAN FIND THE ANSWERS TO THESE GAMES IN SECRETS REVEALED (P. 66).

MISMATCHING

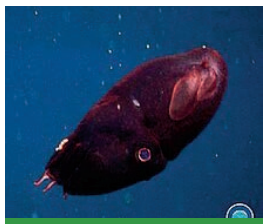
Match the words on the left with the words on the right to make five logical fallacies. Hint: avoid mismatching the one pairing that is already correct.

INVINCIBLE	CRITIC
PREVALENT	PROOF
TRAITOROUS	IGNORANCE
LOGIC	SLOPE
SLIPPERY	CHOPPING

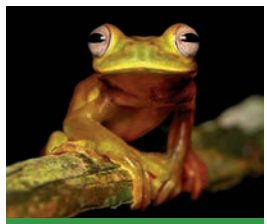
FAKE OUT

At least one of the following animals is not real. Can you find the fake(s)?

VAMPIRE CRAB



VAMPIRE SQUID



VAMPIRE FLYING FROG

VAMPIRE MOTH

VAMPIRE RABBIT

LEGO ALERT!

Released in early 2025, "The Evolution of Stem" LEGO set (#21355) includes many elements for skeptical science enthusiasts, including three inspirational minifigs: "Marie Curie (née Skłodowska), the first person ever to win two Nobel prizes; Sir Isaac Newton, famous for his law of universal gravitation; and pioneering agricultural scientist George Washington Carver." Carl Sagan's work is even represented through his contributions to "the NASA Voyager Probe with the Golden Record on board for any extraterrestrial life form that may find it" (you can find it on the bottom right). A DNA strand stands out as the most notable feature (you may have also noticed that a DNA strand is part of the Center for Inquiry's logo).

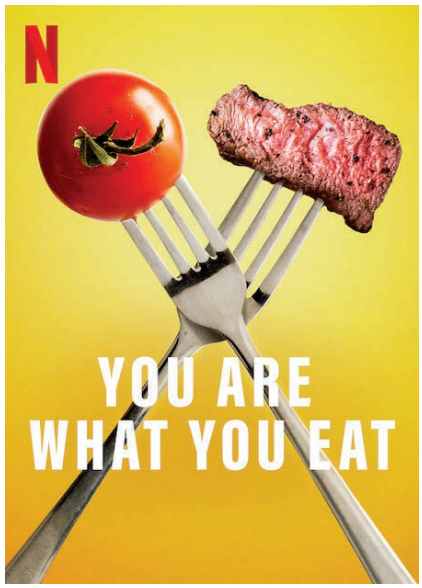
Are You What You Eat? Science vs. TV Series

Brian Kerby

In 2024, Netflix released the documentary series *You Are What You Eat: A Twin Study*. The docuseries follows four pairs of twins (two sets of women and two of men) from the twenty-two pairs of twins who participated in a research study published the prior year (Landry et al. 2023a).

As the series purports to be about a scientific study, it's difficult to watch without noticing the blatant biases and limitations. The premise is simple enough: randomize identical twins to either a vegan diet or a healthy omnivore diet for eight weeks. Collect objective data to evaluate differences between groups with the primary outcome of interest being LDL-C ("bad" cholesterol) level. There were also various and sundry secondary outcomes measured, such as insulin levels and weight loss. The docuseries includes that data but also adds in quite a bit of subjective, bias-prone information. Three examples (of many) will be familiar to skeptics. The first is apparent both in the series and the paper.

The authors provided prepackaged prepared food to both groups for the first four weeks. During weeks five through eight, the groups shopped for and prepared their own food. At this point, an argument can be made that the study ceases to be controlled and becomes observational. In fact, in episode 3 of the documentary one of the authors states concern for the lack of control and the ability to monitor adherence. He states that participants will be "asked about their diet … asked about their mental clarity" and will have to provide blood, stool, and urine samples. Body fluid samples may be objective measurements, but asking participants about diet adherence and mental clarity is a good example of adding (unintentional) social desirability bias (i.e., "lying" to look good). Another example



You Are What You Eat: A Twin Experiment. Directed by Louie Psihoyos. OPS Productions, 2024.

of bias appears only in the TV series, which is the evaluation of a vegan vs. omnivore diet on women's sexual arousal shown in episode 4.

At baseline, the women watched a pornographic video while an infrared camera focused on their genitals to measure any increases in temperature, a sign of arousal. (Men's sexual arousal associated with a plant-based diet was presented in a previous docuseries, *The Game Changers*.) After eight weeks, the women's sexual arousal was measured again using the same method. Both women on the vegan diet had increased arousal, of 371 percent and 383 percent. However, the omnivores also had increased arousal, at 212 percent and 288 percent. Following the evaluation, one of the women in the omnivore group remarked, "I found some good porn this time." Baseline error, anyone? Not to mention that there are several other unaddressed confounds that may affect arousal. As this outcome was only evaluated for the four women in the series, it's much too small a sample size to be meaningful. Yet there is something even more striking that skeptics will notice in the reveal of the secondary outcome Trimethylamine N-Oxide (TMAO) blood level.

Higher levels of TMAO, a measurement of inflammation, are associated with cardiovascular disease and have been studied as a causal factor (Canyelles et al. 2023). Improvement for one vegan twin, Pam, is revealed during the final episode. A study author proclaims that her TMAO level "has plummeted and stayed down," shown on screen as a decrease of 350 percent, while her omnivore twin, Wendy, had an increase of 160 percent. What does it mean to have a decrease of 350 percent? Does it mean that most vegans dropped by 10 percent, and Pam dropped 45 percent? Referring to the paper, the changes in TMAO were *not* statistically significant. In the docuseries, however, the outcome was reported with great enthusiasm and, bizarrely, *as being* statistically significant.

As a decrease of 350 percent is impossible, I reached out to the author featured in the series. After a brief email exchange, it was not only confirmed that it was indeed impossible—but also that he didn't actually say that.

I watched with subtitles, and a graphic of "🡻350%" accompanies his subtitle of "plummeted and stayed down." Once I provided him with a screenshot, he understood my confusion and seemed concerned about the representation. (This example might be a lesson for scientists regarding the need to try to secure some editorial control.) This particular point may be quite specific, but it demonstrates how science is portrayed (or misportrayed) in the docuseries. Aside from the foregoing examples, there were other opportunities

to show how science is done.

One instance occurs during the vignette on fish farming in episode 3. An activist states that 98 percent of farmed salmon sampled from supermarkets and sushi restaurants tested positive for *piscine orthoreovirus*, which is associated with disease. However, were wild salmon also sampled as a comparison? It's not mentioned but would have been a great time to demonstrate a bit of protocol with just a few words, such as "as compared to wild salmon, which were infected at a rate of . . . ." Indeed, I easily found research that the virus is prevalent both in diseased farmed salmon *and in asymptomatic farmed salmon* (Polinski et al. 2019).

Many proclamations of findings for the digressions lack sources. One is the claim made in episode 4 that lifestyle changes can *reverse* (not slow but *reverse*) cognitive decline. A simple reference would show process of discovery. For example, just a few seconds earlier it's related that eating a more plant-based diet reduces the risk of Alzheimer's disease by 53 percent. This information is preceded by "in one study in Rush University in Chicago." It is only one study, but at least it's a source that can be found with minimal effort. Unfortunately, the study is summarized more definitively in the docuseries than is the actual case. The study concludes that there "may" be a reduction in risk, and if so, it's a "reduction in the rate of developing" Alzheimer's disease (Morris et al. 2015, 5). The docuseries conflates hazard ratio and relative risk, resulting in what may be a much rosier picture than the actual Rush study. There are also some instances of faulty reasoning. One prominent person implied that because changing their lifestyle "worked for them," such a change would work for everyone.

Scientific protocol aside, the series truly relies on digressions into emotion-evoking reasons to promote a vegan lifestyle: frequent detours involving vignettes on factory farming of beef, chickens, fish, and pigs; the plight of abutters whose homes are coated in vaporized feces and urine from hog farm cesspools; saturated fat and its association with Alzheimer's disease; food deserts; antibiotic overuse; Amazonian deforestation; and climate change. These and other digressions are designed to foment empathy. Less compelling are the stories of a $300-a-meal restaurant going vegan, the history of an alternative cheese maker, urban gardening, the Berkeley Alt Meat Lab, a segment on maintaining a clean kitchen, and such. Digressions and emotions aside, what were the results of the study?

All in all, those on the vegan diet had more success in the primary outcome of lowering LDL-C than those on the omnivore diet. As would be expected, both groups lost weight as they all were on a healthier than usual diet. Some other secondary outcomes also improved; others did not. Though not well addressed by the docuseries, the research study included many limitations, potential biases, statistically insignificant findings, and some comments of note.

One is that causal statements regarding the lowering of LDL-C due to the vegan diet cannot be made and may only correlate. This is due to confounding factors such as weight loss and the adoption of an overall healthier lifestyle. The other is that improvements to diet, vegan or omnivore, can result in positive health changes, and a diet with some dairy and meat can indeed be a healthy diet. Perhaps most important is that the four sets of twins featured in the series were followed more closely and prodded to engage in exercise. This personal attention could result in better "lifestyle behaviors and adherence to study protocols" than other participants (Landry et al. 2023b, 6). Four sets of twins out of the twenty-one that completed the study is close to 20 percent of the sample. Is that enough to skew the entire results? The study authors thought perhaps so, and as such analyzed the data both with and without the docuseries twins—finding no difference (Landry et al. 2023b, 7). However, despite the flaws, the docuseries may provide multiple lessons for skeptics in changing minds.

How likely is it that a scientific study, even paraphrased, will change minds? What is the limit of evidence and reason to influence change on a large scale? How many of us truly understand why we make the decisions we do, trust the experts we trust, believe what we believe, or think what we think? How much do we ignore or fail to admit the role emotions play? It's food for thought. ■

Acknowledgment

The author would like to thank and acknowledge his professors from SUNY Buffalo for their instruction and contagious enthusiasm.

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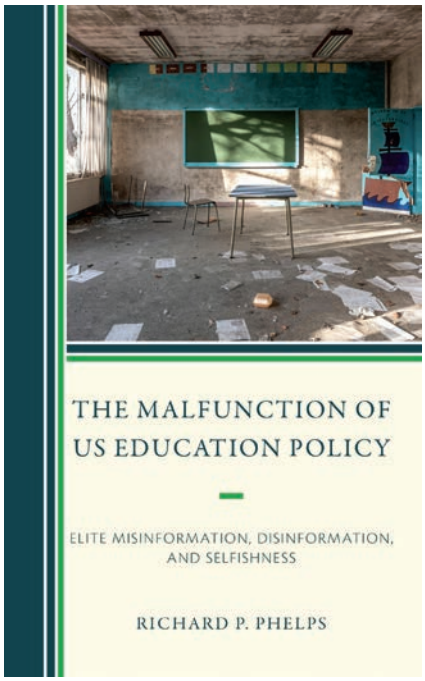
How We Ended Up with Substandard Tests in Education

Katharine Beals



The Malfunction of US Education Policy. By Richard Phelps. Rowman & Littlefield, 2023.

Education is in crisis, with absenteeism at an all-time high, test scores stubbornly low, and many high school graduates inadequately prepared for college and the workplace. The trend began well before the pandemic and continues to this day. It persisted during two decades of concerted efforts, including new state-wide standards and standards-aligned curricula and two big infusions—recession-era and pandemic-era—of government funding.

How did we get here? Richard Phelps's *The Malfunction of US Education Policy* provides one of the most comprehensive explanations I've seen. Phelps is the founder of the Nonpartisan Education Review and vice president of the Institute for Objective Policy Assessment. His eclectic experiences include teaching secondary school math and science in a village in Burkina Faso.

Phelps's book might appear narrowly focused; its main topic is educational testing, not curricula, pedagogy, teacher training, or school culture. But educational testing, done well, is the yardstick for everything else. Imagine if for the past two decades we had what Phelps argues are the sorts of tests we should have had—and that some states, indeed, used to have and that most developed countries have used for decades. That is, high-stakes, high-standards, high-security state-wide tests that: 1) are administered at transition points between levels of education with content covering the full battery of academic subjects; 2) contain specific content determined by what students are supposed to have been taught in school; 3) result in consequences for students based on test performance.

The results of such tests would indicate not just whether a specific student is ready to graduate from elementary, middle, or high school; more aggregately, they would indicate which curricula and teaching methods are more or less effective. While one can make all the cognitive science-informed arguments one can muster, say, *against* balanced literacy or constructivist math or *for* direct instruction and precision teaching, only well-designed, well-administered tests provide the kind of hard, unambiguous, public data that motivates reform.

Not only did many state tests have some or all the above features, but additional states had similar tests in the works. But these were supplanted in 2014 by a tsunami of novel tests with opposite characteristics:

low-stakes (especially for students), low-standards (especially from fourth grade onward), low-security (which correlates significantly with score inflation), and, for the first six years (third to eighth grade), administered every year so that they can realistically cover only two to three subjects (primarily math and language arts). These tests, "less useful, informative, or reliable," are the products of the 2010 Common Core state standards that were supposed to raise educational standards across all fifty states. How we ended up with such substandard tests is the centerpiece of Phelps's book.

The culprits are multi-faceted: traditional and progressive; Republican and Democrat; education school- and think tank–based; as well as government-, foundation-, and media-enabled. But what set all this in motion was a single event: the passage in 2002 of the No Child Left Behind Act designed to boost the achievement of all K–12 students.

The underlying problem is one facing all reformers, donors, and journalists who aren't experts in the areas they've targeted: not knowing which experts to consult, they turn to the most visible and most apparently credentialed. But as Phelps shows, there is a large gap between visibility and apparent credentials on one hand and actual expertise on the other. Those most visible in education belong to one of two "cartels"—a Democrat-leaning Education Establishment Cartel, consisting mostly of education schools and their affiliates and opposed to high-stakes, high-standards testing, and a Republican-leaning Education Reform Cartel, consisting mostly of economists and political scientists and deferential to the Establishment Cartel's professed expertise on testing. While their contrasting political leanings might suggest they span the education spectrum, vast sectors of educational testing specialists—particularly in psychology and program evaluation—have gone largely unheard. So have vast amounts of prior research, some of it centuries old, casualties of a growing tendency toward what Phelps calls "strategic scholarship": citing the work of one's promoters and fellow cartel members, suppressing that of others, and frequently claiming to be the first to research particular questions.

In meticulous detail, rife with references, Phelps shows how such self-serving, "subtractive" scholarship, combined with under-informed reformers and donors unchallenged by under-informed journalists, has led to our current reality: one where "graduation rates are meaningless, and now so are academic course completion requirements." Just like education, education scholarship cries out for reform, and Phelps pulls no punches: "In a truth-seeking, knowledge-accumulation research culture, the Popperian dialectic would assure that newer was indeed better. In Cartel Alliance culture, with its pervasive information suppression, the opposite is often true." This applies, I suspect, well beyond K–12 education research. *The Malfunction of US Education Policy* contains important lessons for us all. ■

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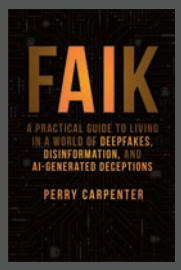
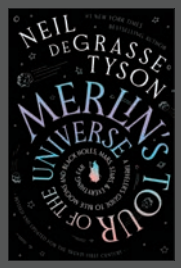
[NEW AND NOTABLE BOOKS

Edited by Stephen Hupp. Listing does not preclude future review.



FAIK: A Practical Guide to Living in a World of Deepfakes, Disinformation, and AI-Generated Deceptions. Perry Carpenter, a cybersecurity expert and host of the *8th Layer Insights* podcast, helps readers protect themselves and others from scams that utilize artificial intelligence. The author discusses the book in episode 242 of the *Squaring the Strange* podcast. Wiley, 2024.

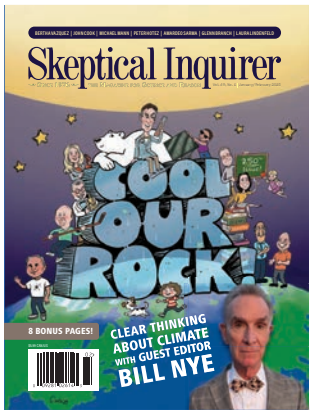


MERLIN'S TOUR OF THE UNIVERSE, REVISED AND UPDATED FOR THE TWENTY-FIRST CENTURY: A Traveler's Guide to Blue Moons and Black Holes, Mars, Stars, and Everything Far. In this newly revised book, astrophysicist Neil deGrasse Tyson humorously answers questions through the voice of Merlin, a fictional character and "timeless visitor from Planet Omniscia in the Andromeda Galaxy." Blackstone Publishing, 2024.

QUACKERY AS A PUBLIC HEALTH PROBLEM. William Mathew London, editor of Consumer Health Digest, provides a thorough bibliography offering "descriptions of 231 works, including eight SKEPTICAL INQUIRER articles, addressing the global marketplace for questionable and dubious methods of treating and preventing health problems. Authors who have written for SI or who have spoken at SI events are well-represented." Oxford University Press, 2024. [Image created for SI.]

SOCIAL PANICS & PHANTOM ATTACKERS: A Study of Imaginary Assailants. This book by sociologist Robert E. Bartholomew and folklorist Paul Weatherhead "is not only of interest for scholars and students of sociology, criminology, social psychology, media studies and history but also appeals to a lay audience interested in urban legends and true crime." See also Bartholomew's coverage of Havana Syndrome earlier in this issue. Palgrave Macmillan, 2024.

SOMEONE SAID PARENTAL ALIENATION: About Divorcing Families Whose Children Avoided One Parent. Developmental psychologist Jean Mercer skewers parental alienation, "a legal concept without validated psychological definition, assuming that children who resist contact with one divorced parent have in many cases been 'brainwashed' or persuaded to do so by the machinations of the preferred parent." Mercer also wrote about parental alienation in the March/April 2025 issue of SI. Routledge, 2025.



Political Posturing

I was quite disappointed with your climate issue (SI, January/February 2025). I so enjoyed many previous articles referenced in the letters section, such as the Winchester Mystery House, tarot cards, the mysterious disappearance of the light house workers, and the children who "witnessed" UFOs. Why were they so good? Because they were refreshingly devoid of political posturing. I had no idea of any author's political views, nor would I be interested. Why would you suddenly throw all that out the window?

James Brachman
Newport Beach, California

Editor Stephen Hupp responds:

Thank you for your kind words about several of our articles. Thanks also for sharing your thoughts about how we handled the special issue on climate, though I disagree with your claim that the issue was an exercise in "political posturing." Perhaps your point would have been stronger if the issue had come out before the presidential election, but the issue before the election had a cover bearing the title "Science over Party: Five Tips for the Left and Right." For that issue, by the way, we had to defend against claims of bothsideism (see the previous letters section for Timothy Redmond's response to that claim).

Over 98 percent of Earth scientists reported believing in human-caused climate change in a replication study ("Consensus Revisited: Quantifying Scientific Agreement on Climate Change and Climate Expertise among Earth Scientists 10 Years Later" Myers et al. 2021). In the earlier research, the figure was closer to 97 percent. Thus, given that the climate issue reflected the scientific consensus, I'd say we were engaging in scientific posturing *rather than* political posturing. *I'd also like to point out that the article on nuclear power was more consistent with beliefs of the political right, whereas climate change more broadly is more consistent with the political left.*

I acknowledge that my own news piece—"President-Elect Trump's Cabinet Nominations"—is inherently political. It was in fact the first time I've written such a political piece, but I felt compelled to cover that news as it was breaking just days before sending the issue to press. Yet still, I wasn't engaging in political posturing; I was engaging in scientific posturing. Beyond the topic of how the nominations related to climate change, I was expressing concern over nominations such as that of Robert F. Kennedy Jr. to head the Department of Health and Human Services. He has repeatedly made false and harmful claims about health, especially about vaccines. Those claims used to come from the far left and now the far right has jumped on that bandwagon. I ask you to join us in the scientific neutral zone and stick with us when we're compelled to cover science news that happens to overlap with politics. Thank you for sharing your thoughts and for reading SI.

Teaching Climate Change

Re: The special section on climate change in the January/February 2025 issue: As a globally recognized climate scientist, I have several quibbles, mainly with the education article written by Bertha Vazquez. Most are oversimplifications or errors that could be corrected by relatively small wording changes. There is, however, an important omission: the myth that climate models are poor at simulating observed climate changes. My article in the March/April 2020 issue ("How Good Are Past Predictions of Global Warming?") shows that projections of global-mean temperature (GMT) changes, made since 1992, have been excellent. The year 1992 is significant here because this was the first year that the important cooling effects of aerosols were included in future GMT projections. Aerosol effects are not mentioned in the article. Further, the author states that the assumption that climate change is linear is a misconception. Not so; at the global scale, for example, the relationship between climate change and radiative forcing is very nearly linear, and simpler climate models (upwelling-diffusion, energy balance models) are basically linear. A second oversimplification is the claim that variations in the Gulf Stream are driven by melting ice. Not so. The Gulf Stream *per se* is largely wind driven. A third error is that the ocean will become more (by implication, appreciably) acidic "in the next 5 to 10 years." In fact, the likely change in pH between 2025 and 2050 if we can follow the Paris Agreement (PA) is less than 0.01 units, and changes beyond that (again, if we can follow the PA, which is admittedly unlikely) will be even smaller. Perhaps the forthcoming book by Vazquez and her coauthors will allow these issues to be addressed in more detail and more correctly. The article by Amardeo Sarma on nuclear energy, I should add, is one of the best short summaries of this topic I have ever seen.

Tom Wigley
Boulder, Colorado

Bertha Vazquez responds:

This article in SI was excerpted from my book, What Teachers Want to Know about Teaching Climate Change *(coauthored with Kimberly Waite and Lauren Madden). We should have stressed in the original article that the book is written for science teachers, not climate experts such as Tom Wigley. Wigley suggests these misconceptions are easily corrected, but please keep in mind that teachers frequently encounter them. The book addresses common student questions such as, "But it's only 2 degrees more (in Fahrenheit). That's nothing! Why is that a big deal?"*

Teachers face significant challenges in effectively teaching climate change in the current educational landscape, including a lack of teacher expertise in climate science, limited instructional time dedicated to the topic, and a lack of support from state science standards. For example, a 2023 survey by the North American Association for Environmental Education found that nearly 60 percent of teachers felt unprepared to integrate climate change lessons into their core classes. Another survey conducted by the National Center for Science Education revealed that most teachers dedicate only one to two hours per year to climate change education! And only one state (New Jersey) explicitly includes the teaching of climate change in its state science standards. Wigley provides excellent examples of linear relationships found in climate science. Sadly, these exceed the scope of almost all school curricula.

Cranky Uncle Game

John Cook's article "The Cranky Uncle Game" (SI, January/February 2025) mostly addresses logical errors and ways to encourage better thinking. Recently, I read an article by Tim Harford ("Fake: It's Only a Matter of Time Until Disinformation Leads to Calamity") who reports on results from Ariana Modirrousta-Galian and Philip Higham. They appear to have used similar gamification and found that subjects were better at identifying fake news but also more likely to disbelieve real news. I wonder how Cook would reconcile these results with his own research. As always, SI is great food for thought.

Van Knowles
Lexington, Kentucky

John Cook responds:

Discernment between facts and myths is an important concept in misinformation research. While interventions countering misinformation are designed to decrease belief in misinformation, we also want to avoid making people cynical and distrustful of accurate information. We explore discernment between belief in vaccine facts and myths in a pilot study testing the Cranky Uncle Vaccine game ("Co-Designing and Pilot Testing a Digital Game to Improve Vaccine Attitudes and Misinformation Resistance in Ghana," Cook et al. 2024). We found that discernment increased after playing the game. That is, belief in myths decreased while belief in facts increased. The game is a combination of explaining vaccine facts and explaining how misinformation techniques distort the facts, indicating that the combined approach of fact-based and technique-based inoculation is an effective way to boost discernment.

Threats to Humanity

To Michael E. Mann and Peter J. Hotez's Triple Threat to Humanity article (SI, January/February 2025), I would add to climate change, pandemics, and anti-science a fourth threat: human overpopulation. Consistently increasing by a million people every four or five days, the population of our finite planet has doubled in the past fifty years. This underreported threat is the proximate cause of the first two threats, as well as of environmental degradation, species extinction, conflicts over land and resources, genocides, and forced migrations. While not a cause of the third threat (anti-science), overpopulation may well be exacerbated by the anti-science denial of its very existence.

Peter Wyble
Chicago, Illinois

Global Climate Predictions

Thanks for your wonderful issue on climate change (SI, January/February 2025). I would like to make a clarification to Bill Nye's opening remarks. James Black at Exxon did not make any predictions about global climate in his 1977 report to Exxon management. All the predictions and all the graphs in that report came from peer reviewed literature and U.S. government reports. Black, in that report, was summarizing the state-of-the-art knowledge of global warming and what would happen if we continued down the path of burning fossil fuels. All the information Black presented was available to anyone with access to a decent library. We can blame ourselves for our inaction.

Howard Feldman
Retired ExxonMobil
Geologist
Fort Collins, Colorado

Rapa Nui

Nathan H. Lents's piece on Rapa Nui (SI, January/February 2025) is interesting. It would be helpful to add that the island is far better known in the English-speaking world as Easter Island.

Ray Ward
London, England

Fringe Zoology Correction from the Author

In "Fringe Zoology: The (In) Convenience of Disappearing Evidence" (SI January/February 2025), the date of Mitchill's publication was given as 1918 but should have been given as 1818. Also, it would be more accurate to say that he "described" the specimen that year rather than "discovered" it; it was actually found by others in 1816 or earlier. The author thanks Tyler Greenfield for these corrections.

Constitution Date Correction

The note on page 5 of SI January/February 2025 states that Article 1, Section 8 of the U.S. Constitution was written in 1786. It was written in 1787.

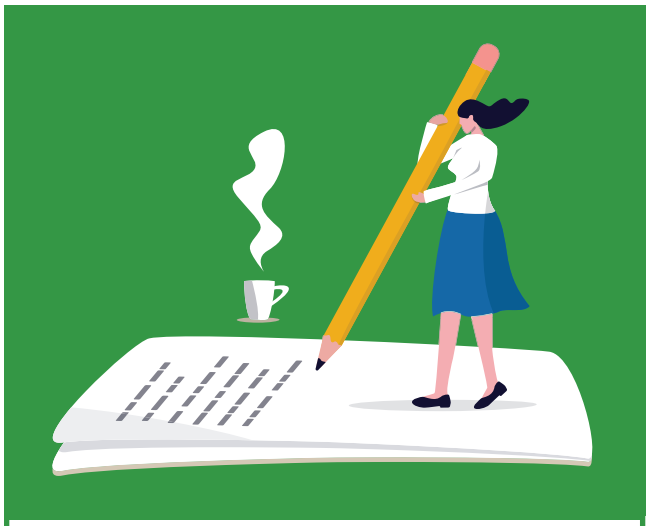
Word Noodle Correction

In the Word Noodle puzzle in the Fun & Games section of the January/February 2025 issue, the letter "N" is correct and in the correct position and should therefore be colored green, not yellow. I love this magazine; in all the years I have been reading it, this is the only error I have found!

Wayne Hodgins
Quebec, Canada

Editor Stephen Hupp responds:

Dang, you're right. We do appreciate corrections. In addition to acknowledging them here, we are also able correct them in the digital versions of the articles. You've added extra salt in the wound by saying the first error you found was caused by me, but I'm thankful nevertheless. Many thanks also to Jason Warshawsky (Newberg, Oregon) for sending in the same correction, though without any added salt.



Send in a Letter to the Editor

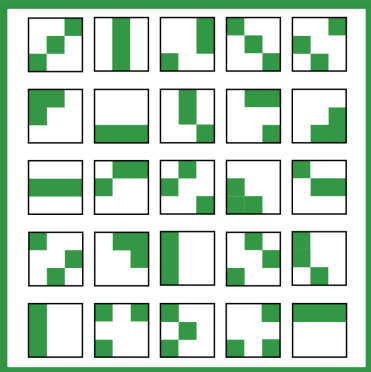
Letters to the Editor are for views on matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters received, not all can be published. Those selected may be edited for space and clarity. Authors criticized in the Letters column may be given the opportunity to respond in the same issue. Submit Letters to the Editor by email text (not attachment) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g., "Smith letter on Jones evolution article." Include your name and location (City, State) at the end of the letter.

SECRETS REVEALED

Code Cracked: Congratulations to Peter Weichman!

The Fun & Games section of the November/December 2024 SI included a puzzle titled "Crack the Code" (see below). Peter Weichman sent in the correct answer with this explanation: "Crack the Code solution: GOLDEST CHAMPION. The solution is obtained by matching the Connectivity Puzzle grouping patterns in the first five 2024 SI issues to those in the 5 x 5 grid on p. 59 of the sixth issue. The non-blank squares are then assigned according to the letters of the alphabet seen in the Stuart Vyse article photo on p. 54. The answer is an anagram of the ordered letter list ACDEGHILMNOOPST, which is then properly organized according to the table below based on SI issue number and the Connectivity puzzle group ordering (listed in the answers for each Connectivity game provided in the Secrets Revealed section of each issue)."

Crack the Code section from November/December 2024 and the clue from Stuart Vyse's article:



SI Issue	Connectivity Answer Groups			Page Numbers	
	#1	#2	#3	F&G	SR
January/February 2024	G	O	L	61	64
March/April 2024	D	E	S	60	66
May/June 2024	T	C	H	64	66
July/August 2024	A	M	P	65	66
September/October 2024	I	O	N	58	65
November/December 2024	Key			59	n/a

Note: F&G = Fun & Games; SR = Secrets Revealed

This is the Connectivity game from the January/February 2024 SI modified to emphasize the group #1 only (as indicated in the Secrets Revealed section, "Group #1: A crystal ball, chicken bones, and tarot cards are tools to see the future"). Three green squares on the bottom row represents "G" in the key:

Find 3 groups of 3 connections...

SPOCK	COOKIE	HUNTER
TELLER	CARRIE	ANAKIN
BONES	BALL	CARDS

Weichman is a long-time subscriber and professional theoretical physicist from Bedford, Massachusetts. He credits his daughter as being a "long-time participant in the famous annual MIT puzzle hunt," adding that he got "many hints from her about the right way to approach these types of instruction-free puzzles." Stephen Hupp, editor of SI, sent Weichman a copy of the "Bigfoot Is Dead" issue, signed by both Benjamin Radford (cover story author) and Celestia Ward (cover artist), and a personal check for $100. "I am so excited!" Weichman shared, "This is the first time I have made a profit off my 60+ year interest in ciphers and puzzles." This is the first prize-worthy puzzle solved. Several more can be found in the other 2024 SI issues.

***Mismatching* Answer**

- Invincible ignorance = simply ignoring evidence
- Prevalent proof = mistaking majority vote for truthfulness
- Traitorous critic = using a person's affiliation as the reason for the criticism (and suggesting they leave)
- Logic chopping = focusing on an argument's trivial details
- Slippery slope = rejecting an initial small action because it may lead to significant undesirable results

***Fake Out* Answer**

- Real: Vampire crabs (Geosesarma dennerle) have distinctive yellow eyes. They don't suck blood.
- Real: Vampire squids (Vampyroteuthis infernalis, "vampire squid from hell") have distinctive large blue eyes and a cloak-like webbing. They don't suck blood.
- Real: Vampire flying frogs (Vampyrius vampyrus) are tree frogs that glide between trees and have two fang-like hooks in their mouths as tadpoles. They don't suck blood. Note: We couldn't freely access an actual image, so the photo is actually a fake!
- Real: Vampire moths (Calyptra thalictri) drink blood, including that of humans.
- Fake: Vampire rabbits don't exist; however, Bunnicula is a children's novel and TV series about a somewhat vampiric bunny who sucks carrot juice, not blood, to strengthen his paranormal abilities.

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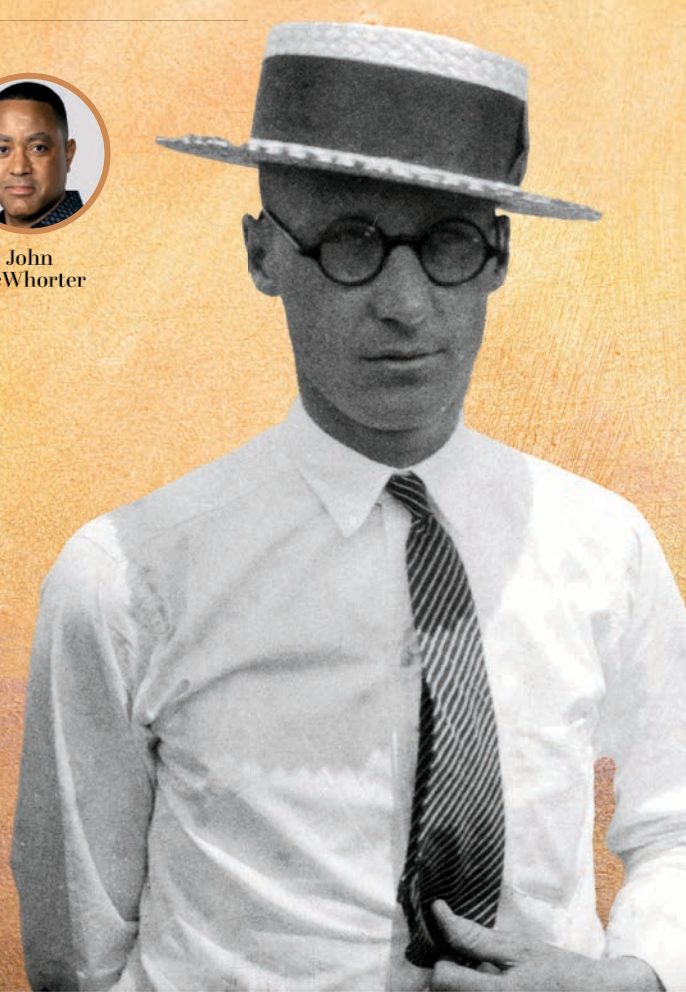

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